

Volume: 1
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UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

Civil Action No.: 85-2463-WD

UNITED STATES OF AMERICA,

Plaintiff,

v.

CHARLES GEORGE TRUCKING COMPANY, INC.,
ET AL.,

Defendants.)

Civil Action No.: 85-2714-WD

COMMONWEALTH OF MASSACHUSETTS,

Plaintiff,

v.

CHARLES GEORGE TRUCKING COMPANY, INC.,
ET AL.,

Defendants.)

DEPOSITION of CHARLES P. RILEY, JR.,
taken on behalf of the United States of America,
pursuant to the applicable provisions of the
Federal Rules of Civil Procedure, before Deborah
L. Fitzpatrick, Registered Professional Reporter
and Notary Public in and for the Commonwealth of
Massachusetts, at the offices of Wynn & Wynn, 84
State Street, Boston, Massachusetts, on Tuesday,
March 12, 1991, commencing at 10:40 a.m.

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I N D E X

WITNESS DIRECT CROSS REDIRECT RECROSS

CHARLES P. RILEY, JR.

BY MR. FRANKEL 7
BY MR. GOODE 142

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2

CHARLES P. RILEY, JR., Sworn

3

4

MR. FRANKEL: Good morning again,

5

Mr. Riley.

6

THE WITNESS: Good morning.

7

MS. BECK: Are we reserving all

8

objections, except motions to strike and the

9

objections except as to form, until the time of

10

trial?

11

MR. FRANKEL: Yes. That's fine.

12

MS. BECK: And Mr. Riley will read

13

and sign the deposition?

14

MR. FRANKEL: That's fine, also.

15

MS. BECK: That can be under pains

16

and penalties of perjury instead of notarization?

17

MR. FRANKEL: Fine.

18

MR. GOODE: An objection for one is

19

an objection for all, as well?

20

MS. BECK: That's fine with me.

21

MR. FRANKEL: That's fine.

22

MR. GOODE: I heard them say that in

23

other depositions, so I figured I'd better say

24

that, too.

1 MS. BECK: There are so few today,
2 it won't be a problem.

3 MR. FRANKEL: Just as a preliminary
4 matter, counsel for Stepan has asked me to
5 introduce as -- I'm trying to think what we named
6 the exhibits last time so we don't reproduce the
7 same numbering. We can call this Riley Exhibit 1.
8 I would like to introduce the stipulation
9 concerning the deposition of Charles Riley, Jr.
10 that was entered into by the United States and by
11 Stepan prior to this deposition. I believe the
12 stipulation speaks for itself.

13 (Exhibit 1 marked for
14 identification).

15 For the record, this is a deposition of
16 Charles P. Riley, Jr., who has been designated as
17 an expert by Stepan Company in this action, which
18 is U.S. vs. Charles George Trucking Company, et
19 al., pending in the United States District Court
20 for the District of Massachusetts.

21 Before we get started, I just wanted to
22 confirm with counsel for Stepan that Stepan is
23 relying on the deposition testimony of Mr. Riley
24 that was given earlier in this action -- I believe

1 there were two days of deposition -- as, I guess
2 it would be called, Stepan's expert report or
3 expert submission pursuant to the Court's case
4 management order which required the filing of such
5 reports by December 18, 1990.

6 MS. BECK: Just to clarify that.

7 That's true to the extent that this
8 deposition, as your reports were, were a basic
9 outline of what this witness is going to testify
10 to as an expert. Your expert reports were only --
11 one of them was one page long and the other one
12 was, in substance, two pages long, and the expert
13 testimony was obviously more substantial than what
14 the report specified. So Mr. Riley's expertise
15 and expert opinion will flesh out what was covered
16 in the deposition that he gave for two days last
17 summer.

18 MR. FRANKEL: You haven't issued any
19 other reports, other than this --

20 MS. BECK: No.

21 MR. FRANKEL: -- deposition?

22 MS. BECK: No.

23 ---

DIRECT EXAMINATION

BY: MR. FRANKEL:

Q. Mr. Riley, I just wanted to ask you a couple more questions about your educational background. I believe I asked you a few questions last time we met, but now that you've been designated as an expert, I'm just going to pursue that a little further.

I believe you indicated previously you testified that you have received a B.S. and a master's degree; is that correct?

A. Yes.

Q. You received your B.S. from Lowell Technological Institute; is that correct?

A. That is correct.

Q. Could you describe for me the types of courses you took at the Lowell Technological Institute?

A. Basically --

Q. This is before you got your B.S. degree.

A. The first year, inorganic chemistry and qualitative analysis, along with -- basically, are you asking for chemistry courses?

Q. Yes. I'm limiting this to science.

1 A. The first year would be inorganic
2 chemistry and qualitative analysis.

3 The second year would be organic chemistry,
4 two semesters of quantitative analysis, and
5 stoichiometry, S T O I C H I O M E T R Y.

6 Q. What is that?

7 A. That's the calculations that go along
8 with quantitative analysis.

9 The third year would be physical chemistry
10 and additional quantitative analysis.

11 The fourth year would be the organic
12 chemistry of dye stuffs and the application --
13 chemical application of dye stuffs.

14 Q. What are dye stuffs?

15 A. I took a textile application with my
16 chemistry degree when I was in college, and dye
17 stuffs are materials that color cloth. A pink dye
18 produces your pink shirt.

19 Q. What year did you receive your B.S.
20 degree?

21 A. 1954.

22 Q. Did you immediately begin study for your
23 master's?

24 A. Yes. I did one year later in 1955.

1 Q. What types of courses, if any, did you
2 take in connection with obtaining your master's
3 degree?

4 A. The master's degree courses were advanced
5 chemical courses in the application of dye stuffs
6 and finishing agents to textile substrates. One
7 course, for instance, was the physical chemistry
8 of surface active agents.

9 Q. Surface --

10 A. Active agents. Three words.

11 Q. What is --

12 A. A surface active agent is a detergent;
13 what you wash your dishes with is a surface active
14 agent or the soap you wash your hands with.

15 Q. Did you write a master's thesis?

16 A. I did; and I believe I gave you the title
17 of it in my previous deposition.

18 Q. Would you remind me?

19 A. We would have to dig out the deposition.
20 It's in there somewhere.

21 Page 11, certain types of chemicals --
22 excuse me. Page 11.

23 MS. BECK: The first deposition?

24 MR. FRANKEL: Right.

1 A. I don't remember right now the title of
2 it.

3 Q. So you previously testified that the
4 subject was the addition of certain types of
5 chemicals to a fabric medium?

6 A. Yes.

7 Q. Do you recall the title of the thesis?

8 A. No. Part of it was selectivity factor.
9 Those words were involved, but I haven't read that
10 thesis for a long time.

11 Q. Do you know if that's a
12 publicly-available document?

13 A. I believe it is in the library at the
14 University of Lowell.

15 Q. You would have produced that in 1955?

16 A. 1955. I did it in twelve months because
17 I had to enter the United States Air Force. I got
18 it all done in twelve months.

19 Q. You indicated in your prior deposition
20 that you had taken some additional courses in
21 advanced organic chemistry since obtaining your
22 master's degree; is that correct?

23 A. Yes.

24 Q. Could you describe for me in a little bit

1 more detail what those courses involved? What
2 types of advanced organic chemistry it was?

3 A. They were advanced treatises in the field
4 of organic chemistry. Organic is a very broad
5 field. In your undergraduate you take the basic
6 course where you look at a lot of different types
7 of organic compounds. And in the advanced courses
8 you go deeper into certain types of compounds.

9 Q. So as far as you recall now, these were
10 general organic chemistry courses, just more
11 sophisticated --

12 A. Yes.

13 Q. -- than a college course?

14 A. Yes.

15 Q. Do you recall how many such courses you
16 took after obtaining your master's?

17 A. Several.

18 Q. Now, you previously testified that you
19 started in research and development at National
20 Polychemicals around 1957?

21 A. That's correct. I was in the Air Force
22 from 1955 to 1957.

23 Q. '55 to '57?

24 A. Yes.

1 Q. Then from '67 to '70, you worked in
2 manufacturing and engineering at National
3 Polychemicals? Is that correct?

4 A. That is correct.

5 Q. Then in 1970 you became the general
6 manager in the business department?

7 A. That's correct.

8 Q. Mr. Riley, you indicated when we last met
9 that you have worked on certain patents related to
10 products that were produced at the -- I'll refer
11 to it as the Wilmington facility. I'm talking
12 about, I believe it's a plant that was located on
13 Eames Street in Wilmington, Massachusetts that was
14 a National Polychemicals plant and subsequently a
15 Stepan plant. When I say Wilmington plant, that's
16 what I mean.

17 Is that correct; that you at least worked
18 on certain patents?

19 A. Yes.

20 Q. When we last met, I don't know that you
21 specifically indicated the particular patents you
22 had worked on. I think you mentioned that the --

23 A. I came prepared today (handing).

24 MS. BECK: You should let him finish

1 the question just so the record is clear.

2 THE WITNESS: I thought he had.

3 MS. BECK: He was halfway there.
4 You knew where he was going.

5 Q. I was going to ask you, Mr. Riley, if you
6 would indicate to me which particular patents you
7 had worked on, and you have now given me a sheet
8 entitled "C. P. Riley patents."

9 MR. FRANKEL: Why don't I mark this
10 as an exhibit and then I'll ask you a couple of
11 questions about it.

12 (Exhibit 2 marked for
13 identification).

14 Q. Mr. Riley, is this, in fact, a list of
15 the patents that you worked on --

16 A. Yes, it is.

17 Q. -- when you were at the Wilmington plant?

18 A. They were the patents that were awarded,
19 of which I was either a partial owner or a full
20 owner.

21 Q. I see the names Strauss and Terhorst?

22 A. Yes.

23 Q. Can you tell me who those individuals
24 are?

1 A. Strauss was an engineer who was at the
2 company from -- he left in 1967, I believe.

3 Terhorst was a consultant. He came from
4 the Baltimore area.

5 Q. I also see Lasman, L A S M A N?

6 A. Yes. He was a rubber and plastics
7 chemist that worked at National Polychemicals.

8 Q. Do you know where he is now?

9 A. Somewhere in the greater Boston area. He
10 left the company in 1971.

11 Q. The first patent you have listed here,
12 No. 3,238,226 says, "Synthesis of Hydrazine
13 Semi-Carbazide, and Hydrazine Dicarboxamide."

14 Is there a way that you can give me a
15 general understanding of what that is?

16 A. This was a process that I developed to
17 make hydrazine, which then could be converted
18 readily into the azodicarbonamide that we've
19 talked about previously as Product No. 2. This
20 put National Poly into making their own raw
21 materials.

22 Q. So this is the process for producing the
23 hydrazine, itself?

24 A. Yes. And in a form that made it easily

1 convertible to the azodicarbonamide. It gave the
2 company an economic advantage for a certain period
3 of time.

4 Q. Do you know when you obtained this
5 patent?

6 A. It was probably issued in about '64 or
7 '65; in that period of time.

8 Q. Were you producing your own hydrazine at
9 that point --

10 A. Yes.

11 Q. -- or did it come later?

12 A. We started in '63.

13 Q. And continued throughout --

14 A. Yes.

15 Q. -- the seventies?

16 A. No. In the early seventies we switched
17 to buying it from the Olin Company. But this
18 process was very advantageous in getting a very
19 low "buy-out" offer from the Olin Company. So
20 this process was run from '63 to roughly '71.
21 Yes, '71.

22 Q. And after that point you purchased the
23 hydrazine?

24 A. Yes.

1 Q. I note that in addition to saying
2 synthesis of hydrazine, it mentioned
3 semi-carbazide and hydrazine dicarbonamide. Does
4 this patent relate to the production of all three
5 of these materials?

6 A. They were all made at the same time. The
7 feed that came out of this process made a mixture
8 of hydrazine, semi-carbazide, and that was
9 converted to the hydrazine dicarbonamide.

10 Q. The next patent, which is 3,305,496,
11 indicates "Activated Azodicarbonamide." Is that a
12 patent for the production of what we've referred
13 to as Product No. 2, or Kempore?

14 A. No.

15 Q. What would that be?

16 A. This refers to the product we called
17 Actafoam R-3. The term activated is referring to
18 causing the azodicarbonamide, or the Kempore,
19 which is the trade name for azodicarbonamide that
20 we've used. Activating the azodicarbonamide
21 refers to decomposing it at a lower processing
22 temperature. There are certain economic benefits
23 in being able to decompose the foaming agent at a
24 lower temperature.

1 Q. As I recall, Actafoam R-1, the raw
2 ingredients were 2-ethylhexoic acid, zinc oxide,
3 potassium oleate, and what's been referred to as
4 DOP.

5 I'm looking at what's previously been
6 marked as Exhibit 18 in your prior deposition.

7 Are you saying that this activated
8 azodicarbonamide is one of those raw ingredients
9 for Actafoam?

10 A. This patent treats the subject of
11 activating azodicarbonamide with materials of that
12 type.

13 Q. They use the Actafoam to activate, so to
14 speak?

15 A. Yes.

16 Q. I understand now.

17 The next one, 3,321,413, talks about
18 "Activated Blowing Agent Compositions." What were
19 the blowing agent compositions?

20 A. These were compounds that were put
21 together that contained the azodicarbonamide, as
22 well as an activator in the same mixtures.

23 Q. So this is another patent relating to the
24 activation --

1 A. That's right.

2 Q. -- of Kempore?

3 A. Right.

4 As I indicated, there was quite race on in
5 Europe and the U.S. and Japan to be able to lower
6 the decomposition point of these foaming agents
7 because it was economic to be able to do that.
8 You could use them with new types of polymers to
9 make certain items that were in need.

10 Q. When you say lower the decomposition
11 point, is that lower in temperature?

12 A. Yes. You wanted to lower the temperature
13 because the temperature at which these products
14 decomposed and gave off nitrogen was higher in
15 many cases than the processing area for the
16 polymer or the melting point of the polymer. So
17 you wanted to bring the point at which the
18 nitrogen was given off down to where the polymer
19 was melted to control the process of forming the
20 foam.

21 Q. 3,393,188, "Polymeric Films Having
22 Moisture-Vapor Transmission Properties and Method
23 of Preparing Same"; does this relate to one of the
24 products of the Wilmington plant?

1 A. No. This was a separate research work
2 that we were doing at the time.

3 Q. The next one, 3,422,030 is "Alkyl Phenyl
4 Phosphite Inhibitors for Alkylated Phenols"; what
5 were the alkylated phenols? Was that a product of
6 the Wilmington plant?

7 A. Not really. The main alkyl- -- it could
8 have been, but basically that referred to a whole
9 range of alkylated phenols, and the subject of the
10 patent was that certain phosphites that could be
11 produced could inhibit the darkening or
12 colorization of these alkylated phenols that were
13 commercial items that were being used. So it did
14 not refer to products being made at Wilmington.

15 Q. It did not?

16 A. No. It referred to a broad range of
17 products on the market.

18 Q. And the alkyl phenyl phosphite inhibitors
19 were to be used in order to control the color of
20 these alkylated phenols?

21 A. Right.

22 Q. Did the Wilmington plant produce the
23 alkyl phenyl phosphite inhibitors?

24 A. Some of them. The patent referred to

1 others that were not produced in Wilmington, also.

2 Q. Can you tell me which ones were produced
3 in Wilmington?

4 A. The trisnonylphenyl phosphite.

5 Q. Is that Wytox 312?

6 A. Yes.

7 Q. Do you remember when the Wilmington plant
8 started to produce Wytox 312?

9 A. It was in the mid-sixties; around 1964,
10 1965.

11 Q. As I recall, is this essentially a patent
12 for how to produce the Wytox 312?

13 A. No.

14 Q. What is it then? Does it explain how to
15 mix it with the alkylated phenols?

16 A. It's a patent that explains the use of a
17 phosphite material to stop an alkylated phenol
18 material from discoloring.

19 Q. So it doesn't describe the production of
20 the alkylated material?

21 A. No.

22 Q. It describes how to use it?

23 A. No -- right.

24 Q. As I recall, there were other Wytox

1 products that were also produced by the Wilmington
2 plant. The polymeric phosphite?

3 A. Yes.

4 Q. Is that a product that was also used for
5 this function?

6 A. It could have been.

7 Q. Do you recall when the Wilmington plant
8 began to produce the polymeric phosphites? I
9 think that's Wytox 345, 355 and 438.

10 A. In the same time period, 1964, 1965.

11 Q. The Wytox 312 and also the 345, 355 and
12 438, did that production continue until the time
13 you left?

14 MS. BECK: Objection.

15 This goes beyond the scope of the
16 stipulation, I think.

17 A. Did it go beyond the time that I left?

18 Q. Yes.

19 A. I can only testify that it went on until
20 I left.

21 Q. And that was 1976?

22 A. Yes.

23 Q. I know you didn't leave Stepan; you left
24 the Wilmington plant?

1 A. Right.

2 Q. The last patent here is 3,553,272.

3 A. That's similar to 3,422,030. Again, it's
4 a protection or a means of inhibiting the
5 discoloration of alkylated phenols type class of
6 compounds.

7 Q. Mr. Riley, can you describe for me
8 generally what precipitation is, or precipitation
9 of a chemical? What is your understanding of the
10 precipitation process?

11 A. Precipitation occurs when you combine two
12 clear liquids and a solid drops out of the system.
13 It's suspended in the liquid system.

14 Q. What type of reaction is that? Does it
15 involve a reaction of materials that are dissolved
16 in each of the liquids that come out of solution
17 as a result of the mixture?

18 A. That's a good description of it.

19 Q. What is it that causes the dissolved
20 particles to come out of solution? Is it because
21 they're ions and they react with each other?

22 A. That's one case.

23 Q. What are the other possibilities?

24 A. There are many of them -- possibilities.

1 Q. Can you give me a couple of them?

2 A. You could have incompatibility of phase.
3 You could have exceeding the concentration laws,
4 the solubility laws. If you have a system where a
5 material is soluble to a certain extent and you
6 add one more crystal of the product, then you can
7 get a precipitate coming out. You can grow
8 precipitates in organic systems that tend to
9 super-cool and stay in the liquid state, and then
10 by adding one crystal under the right conditions,
11 you can set up the whole mass of material. There
12 are many physical, chemical means to get a
13 precipitate in a system.

14 Q. Let me ask you about the issue of
15 solubility. Can you tell me what it means for
16 something to be dissolved? Solubilized; is that
17 the same concept?

18 A. Again, you're asking some very broad
19 technical questions.

20 Q. I'm just asking for your general
21 understanding of what the term means. If I say
22 something --

23 A. If something dissolved, then in very
24 simple terms, you would add a solid to a liquid

1 and you would have only a liquid when you got
2 through.

3 Q. What happens to the solid material in the
4 liquid?

5 A. Well, it depends on the system.

6 Q. Let me give you an example of sodium
7 chloride; is that salt?

8 A. Yes.

9 Q. Table salt. Now, if sodium chloride is
10 put into a liquid --

11 A. What kind of a liquid?

12 Q. Water.

13 -- will some of it dissolve?

14 A. Yes.

15 Q. Now, when you reach a certain point where
16 -- well, what is the process that occurs for
17 sodium chloride, for example, that causes it to
18 dissolve after you pour it into the water?

19 A. The chloride goes into sodium and
20 chloride ions which are floating freely in the
21 water.

22 Q. So the sodium chloride breaks up into the
23 two ions, and the ions float around in the water?

24 A. Right.

1 Q. Now, is there a certain point where if
2 you keep pouring in salt, you'll reach a steady
3 state where there is no more solubility, so to
4 speak?

5 A. Yes.

6 Q. Is that because at that point in the
7 process the sodium and chloride ions are coming
8 back together at the same rate as they are leaving
9 the --

10 A. Right.

11 Q. You've reached an equilibrium?

12 A. You've reached equilibrium, and that's
13 normally called the saturation point of the
14 solution.

15 Q. Now, is it fair to say that you could
16 reach a certain point where if you continued to
17 pour in salt, you would exceed the saturation
18 level and you wouldn't have any more -- you would
19 have salt in the liquid that was no longer -- all
20 the salt would not be dissolved; is that correct?

21 MS. BECK: Objection.

22 MR. FRANKEL: That was poorly
23 worded.

24 Q. You would reach a point where you

1 couldn't dissolve any more salt; is that correct?

2 A. True.

3 Q. Could you tell me, does each compound
4 have a certain saturation ratio or percentage
5 associated with it?

6 MS. BECK: Objection.

7 Can you answer the question in that form?
8 It's an awfully broad question.

9 A. That is true. That is true under certain
10 conditions -- standard conditions of volume, time,
11 temperature, pressure, et cetera. You have to
12 define the conditions.

13 Q. Is it fair to say that certain compounds
14 are more soluble than others, depending upon their
15 chemical nature?

16 MS. BECK: Objection.

17 A. Under defined conditions certain
18 compounds are more soluble.

19 Q. Let me ask you about what we previously
20 referred to as Product 1?

21 A. This is the
22 dinitrosopentamethylenetetramine.

23 Q. Yes.

24 Q. Now, when I ask you questions about the

1 production of the dinitrosopentamethylene-
2 tetramine, as far as the time periods are
3 concerned, assume that I'm asking you about the
4 early 1970s at the Wilmington plant. I don't know
5 if it differed over time at all, but just assume
6 that that's when I'm referring to.

7 I wanted first to confirm that the reaction
8 for dinitrosopentamethylenetetramine is a
9 combination of hexamethylenetetramine, HCl, which
10 is hydrochloric acid, as I understand it, and
11 NaNO₂, which, as I understand it, is sodium
12 nitrite; going to dinitrosopentamethylenetetramine
13 and sodium chloride, NaCl. Do I have that right?

14 A. Yes.

15 Q. Can you explain to me in a little more
16 detail than you did in your prior deposition, how
17 that reaction occurs?

18 (Witness confers with attorney).

19 MS. BECK: Could you clarify what
20 you need him to explain? We don't want to repeat
21 the prior deposition testimony.

22 MR. FRANKEL: Fine.

23 BY: MR. FRANKEL:

24 Q. First of all, can you tell me, is this a

1 one- or a two-step reaction? Are all of these
2 ingredients added in one phase?

3 A. The hexamethylenetetramine was charged
4 first.

5 Q. It was what first?

6 A. Charged. That means added to a vessel.
7 Ice was added -- ground ice for cooling. Sodium
8 nitrite was added, and then the hydrochloric acid
9 was added over an extended period of time
10 controlling the temperature of the reaction.

11 Q. The temperature or the pH?

12 A. PH, basically, and temperature.
13 Temperature was also important.

14 Q. How does the hydrochloric acid control
15 the temperature?

16 A. Well, the reaction. The faster you add
17 the hydrochloric acid, the faster the reaction
18 proceeded, and you would tend to raise the
19 temperature of the batch the faster you added the
20 -- you made the reaction go; and the higher the
21 temperature of the batch, the lower the yield of
22 the product.

23 Q. Now, I believe you testified previously
24 that a filter was used to filter off the Opex

1 material; is that correct?

2 A. Yes.

3 Q. Do you recall what type of filter was
4 used?

5 A. It was what we called a pan filter,
6 P A N.

7 Q. What is a pan filter?

8 A. It's filtration, a piece of equipment
9 that has a perforated bottom. It has a cloth
10 stretched across the perforated bottom. You pump
11 the slurry onto the filter. The liquid goes
12 through the cloth and through the perforated
13 bottom and the product is caught on the filter
14 cloth in the pan.

15 It is also called a neutsch, N E U T S C H,
16 in old German terminology.

17 Q. I take it that the filter had a certain
18 porosity?

19 A. Yes.

20 Q. Obviously, there had to be a way for
21 liquid to get through it?

22 A. Yes.

23 Q. Do you know the size or the distance
24 between the -- or how large the holes were in the

1 filter? Was it measured in microns?

2 A. About twenty-five microns.

3 Q. Do you recall that it was about a
4 twenty-five micron filter?

5 A. Yes.

6 Q. Now, you indicated in your prior
7 testimony that the Opex precipitated in this
8 process?

9 A. Yes.

10 Q. How did it precipitate out of the raw
11 ingredients?

12 A. Well, as the product was formed in
13 solution, it tended to form a solid in the slurry
14 and in the cold conditions. Whereas the
15 hexamethylenetetramine was a clear solution. The
16 sodium nitrite was a clear solution. As you
17 formed the DNPT, its solubility in the system was
18 such that it came out of solution as soon as it
19 was formed and formed what we call a slurry.

20 Q. Was the dinitrosopentamethylenetetramine
21 as a result of the reaction between the sodium
22 nitrite and the hexamethylenetetramine?

23 A. Yes.

24 Q. The HCl did not --

1 A. The HCl is part of the system.

2 Q. But as far as the precipitation is
3 concerned, was the HCl involved in that?

4 A. Yes. Yes. You have no reaction until
5 you add the HCl.

6 Q. Now, in terms of the filtering process,
7 after the reaction occurred, I take it the
8 resulting product was run through the filter?

9 A. Resulting slurry was passed through a
10 filter.

11 Q. Now, do you have an opinion as to whether
12 any of the Opex particles would have passed
13 through the filter? In other words, remained in
14 -- I think you called it -- the filtrate?

15 A. Not normally.

16 Q. Why would that be?

17 A. Because they were larger than twenty-five
18 microns.

19 Q. Would any of the products have been
20 smaller than twenty-five microns in your opinion?

21 MS. BECK: Objection.

22 A. No.

23 Q. Why do you say that? Wouldn't there have
24 been a range of sizes of particles?

1 A. In my opinion, I don't think there would
2 have been any as small as twenty-five microns.

3 Q. What do you base that on?

4 A. Just my knowledge of what the micron
5 sizes were on these products.

6 Q. Did you do any testing of the filtrate,
7 so to speak, to see if any of the Opex particles
8 passed through it?

9 A. No. Well, I'll take that back. The
10 operator would check that. Visually, he would
11 take a sample of the filtrate while it was going
12 through the filter, and if he didn't see any
13 product in the filter, he kept going. If there
14 was a gross tear in the filter, or a misplacement
15 of the filter cloth, then you might see material
16 going through and he would have stopped the
17 process and recycled it.

18 Q. If there were particles of Opex that were
19 smaller than the twenty-five microns, is it fair
20 to say that they would have passed through the
21 filter?

22 A. They would have passed through.

23 Q. Do you know whether such small particles
24 would have been visible to the eye?

1 A. I don't think so. I think the visible
2 range is about fifty microns. That's my
3 knowledge, I guess.

4 Q. Did you ever study the
5 dinitrosopentamethylenetetramine in order to
6 figure out exactly what the grain sizes were? Did
7 you ever do an experiment?

8 A. We did some microscope work with it, and
9 we also did some work on an instrument called a
10 Coulter counter.

11 Q. A what?

12 A. Coulter counter, C O U L T E R.

13 Q. What is a Coulter counter?

14 A. It's an instrument for measuring particle
15 sizes, and it's used in hospitals to take blood
16 counts. In fact, I used to calibrate the machine
17 with my own blood because everybody's blood has
18 the same micron size, 5.71 microns. So when I
19 wanted to run the machine, I pricked my finger and
20 put a little blood in, and I calibrated the
21 machine that way.

22 Q. Do you recall the results of either of
23 those analyses, either the Coulter counter or the
24 microscope?

1 A. The results? In what way?

2 Q. In what you determined with respect to
3 the particle size.

4 A. The average particle size was pretty
5 coarse on the Opex. It was fifty to seventy-five
6 microns probably.

7 Q. Was there a range smaller and larger than
8 that, as well?

9 A. I don't recall.

10 Q. You do not recall whether there were any
11 that were below the twenty-five?

12 A. I don't recall.

13 Q. Let me ask you to assume that some of the
14 particles were smaller than twenty-five microns,
15 and that therefore they would have passed through
16 the filter. Is it fair to say that the filtrate
17 was sent, at least during the early seventies,
18 into the waste water treatment plant?

19 A. Yes.

20 MS. BECK: Objection to the
21 question.

22 Q. Do you have an opinion as to whether or
23 not, I'll call it Opex, it's simpler, would have
24 been found in the gypsum cake?

1 MS. BECK: Objection to the form.

2 A. In my opinion, it wouldn't have been,
3 because Opex would have been destroyed by the
4 strong acid that it met in the sump of the
5 treatment plant. Opex was very susceptible to the
6 strong acid.

7 Q. When you say strong acid, what do you
8 mean by that -- high concentration of an acid?

9 A. High concentration of an acid.

10 Q. What type of acid, in your opinion, would
11 the Opex have encountered?

12 A. You would have had a highly concentrated
13 sulfuric acid stream coming from the ^{process to produce} ~~product to~~
14 ~~the process.~~ ^{Azodicarbonamide on the Kempore.} The azodicarbonamide or the Kempore,
15 when these streams were joined, you had a strongly
16 acid stream which would have decomposed any Opex.

17 Q. What would the reaction have been with
18 the Opex and the H₂SO₄?

19 A. The molecule just splits up, decomposes.

20 Q. The Opex molecule does?

21 A. Yes.

22 Q. What does it form?

23 A. It goes to nitrogen and various amine
24 by-products.

1 Q. Do you have an opinion as to whether or
2 not all of the Opex would have reacted a hundred
3 percent?

4 A. Yes. It wouldn't survive strong acid.
5 It couldn't survive it.

6 Q. You don't believe any of it would have?

7 A. No.

8 Q. Do you know what a nitrosamine is?

9 A. Nitrosamine. Could you define it?

10 Q. I'm not sure I can. I'm asking whether
11 you have an understanding of what that term means.

12 A. Well, it's normally a secondary amine
13 that has a nitroso compound attached to it.

14 Q. What is a secondary amine?

15 A. It's a nitrogen that's bonded in two ways
16 electronically and then has an NO group attached
17 to it.

18 Q. In your opinion, is the
19 dinitrosopentamethylenetetramine a nitrosamine?

20 A. Yes. That would be, I think, a way of
21 classifying it.

22 Q. I believe that this reaction also
23 involved sodium nitrite; is that correct?

24 A. We've already discussed that.

1 Q. I believe you previously testified that
2 filtrate might have a trace amount, which you
3 described as less than one percent, of the sodium
4 nitrite. It's on Page 37 of your deposition.

5 A. Yes.

6 Q. Could you explain for me in a little more
7 detail what you meant previously when you said the
8 sodium nitrite would react with hydrochloric acid?
9 Is it your opinion that there would have been
10 hydrochloric acid in the waste streams?

11 A. Yes. I testified that there would have
12 -- could have been some.

13 I said would have been some; that would be
14 neutralized in the waste stream.

15 Q. Where would the hydrochloric acid come
16 from?

17 A. It was added to make the
18 dinitrosopentamethylenetetramine.

19 Q. So some of the hydrochloric acid in your
20 opinion would have been present in the filtrate as
21 part of the waste stream that was going into the
22 plant?

23 MS. BECK: Objection.

24 A. There really wouldn't have been any, on

1 thinking about it now. Because all of the HCl
2 that was added was used up with sodium nitrite to
3 form the NO that formed the nitrosamine. That's
4 how you get the NO that forms the nitrosamine.
5 The HCl reacts with the sodium nitrite to give off
6 the NO, which attaches onto the amine. And there
7 was an excess -- slight excess of sodium nitrite
8 in the system. So all of the hydrochloric acid
9 would have been used up, consumed, during the
10 reaction by the nature of the way the reaction was
11 run.

12 Q. So is it your opinion now that there
13 would not have been hydrochloric acid in the
14 effluent?

15 A. No. It would have all been converted.

16 Q. But it's your opinion that there would
17 have been trace amounts, i.e., under one percent,
18 of the sodium nitrite, NaNO_2 ?

19 A. Where did I say that? Because one
20 percent -- yes, but then I go on to say --

21 Q. I'll get to that. I'm just talking about
22 what comes right off of the reaction itself.

23 A. Okay. Yes.

24 Q. Now, turning to what happens to it when

1 it gets combined with other waste streams, you say
2 converted to sodium chloride, but I take it if
3 there is no HCl there, it's not going to be
4 converted to sodium chloride?

5 A. It should say sodium chloride or sodium
6 sulfate.

7 Q. Sodium sulfate, is that NaSO4?

8 A. Na2SO4.

9 Q. Would that occur, in your opinion,
10 because of the presence of sulfuric acid?

11 A. Yes.

12 Q. I take it sulfuric acid was one of the
13 by-products of Product No. 2, which is
14 azodicarbonamide?

15 A. Yes.

16 Q. Was it always the case that Product No. 2
17 was being produced at the same time as Product No.
18 1?

19 A. Yes.

20 Q. At least as far as you can recollect,
21 there were not situations where Product No. 1 was
22 being produced and sent into the waste treatment
23 plant without another waste stream coming in from
24 Product No. 2?

1 A. No. These plants ran concurrently;
2 whenever the plant was running, five days a week
3 or seven days a week, both of these plants would
4 be running.

5 Q. With respect to the reaction of the
6 sodium nitrite and the sulfuric acid, is it your
7 opinion that that reaction would go to a hundred
8 percent completion?

9 A. Yes.

10 Q. Is it possible that an equilibria would
11 be reached in the reaction where some trace
12 amounts of sodium nitrite would remain present in
13 the effluent?

14 MS. BECK: Objection to form.

15 A. In my opinion, no, because of the
16 presence of the strong acid would drive it a
17 hundred percent.

18 Q. Do most reactions have both a forward and
19 a reverse reaction associated with them?

20 A. Not all. Some do. Some don't.

21 Q. Which types of reactions would not have a
22 reverse or a backward reaction, as well as a
23 forward reaction?

24 MS. BECK: Objection.

1 A. Frying an egg.

2 Q. How about when you have a mixture of two
3 chemicals, such as sodium nitrite and sulfuric
4 acid; is there any reverse rear action that can
5 occur?

6 A. No. That would not have a reverse
7 reaction.

8 Q. So in your opinion, it's not a situation
9 where you would have an equilibria established at
10 a certain percentage of the reaction on one side
11 as opposed to the other side?

12 A. No.

13 Q. I believe on Page 78 of your prior
14 testimony you indicated that sodium nitrite could
15 be converted to nitrous oxide and sodium sulfate.
16 You just told me about the sodium sulfate, I
17 believe; can you explain for me the nitrous oxide?
18 Is that part of the same reaction?

19 A. Yes. That's what's given off from the
20 NaNO_2 . You get a mixture of NO , N_2O , and NO_2 .
21 There are three oxides of nitrogen, and you tend
22 to get a mixture of those.

23 Q. And the sodium breaks off and attaches to
24 the sulfate?

1 A. Right. It doesn't really, in solution,
2 but you have sodium ions and you have sulfate
3 ions. Sodium sulfate is pretty soluble.

4 Q. Does the reaction that you've talked
5 about with respect to the sodium nitrite and the
6 sulfuric acid, does the degree of the reaction
7 depend at all on the pH of the solution?

8 A. Yes.

9 Q. Can you tell me what that relationship
10 is?

11 A. Well, the lower the pH, the stronger the
12 acid. The stronger the acid system, the more
13 complete this reaction will go.

14 Q. So is it fair to say that if the pH were
15 closer to neutral, that the reaction might not go
16 to completion?

17 A. That's true.

18 Q. As I understand it, there was an addition
19 of lime to the effluent; is that fair?

20 MS. BECK: Objection.

21 What effluent are you talking about?

22 Q. As I understand it, there were various
23 products being manufactured, and that the waste
24 streams were sent into an equalization tank, so to

1 speak, where lime was being added --

2 A. Well, the lime --

3 Q. -- to neutralize?

4 A. The lime was reacted ^{with} to water to form a
5 solution. The solution of calcium hydroxide was
6 added as a neutralizing media.

7 Q. Where was that added -- in the
8 equalization tank?

9 A. No. Streams were mixed in the
10 equalization tanks, so you would have a strong
11 acid system mixing in the equalization tank.

12 Q. Where was the lime added?

13 A. It was added at a subsequent tank after
14 you mixed everything up together.

15 Q. I see.

16 A. So your pH in that equalization tank
17 would usually be very low initially.

18 Q. Do you have an opinion as to what that pH
19 would have been?

20 A. Oh, it would be down around 2, probably.

21 Q. What pH was achieved after the addition
22 of the -- was it calcium hydroxide?

23 A. Basically 7 to 8.

24 Q. What, in your opinion, happened to the

1 sulfuric acid that was in the effluent? Was that
2 all reacted to some other form?

3 A. In the treatment plant?

4 Q. Yes.

5 A. It was reacted with the calcium hydroxide
6 and it formed sodium sulfate, which we call
7 gypsum.

8 Q. Was that a complete reaction in your
9 opinion?

10 A. Yes.

11 MS. BECK: Calcium sulfate, you
12 mean, for gypsum?

13 A. I take that back. I meant to say calcium
14 sulfate.

15 Q. That's the CaSO_4 ?

16 A. Yes; which is gypsum.

17 Q. I recall from your prior testimony that
18 hexamethylenetetramine was produced at the plant?

19 A. Yes.

20 Q. What were the ingredients of the
21 hexamethylenetetramine?

22 A. Formaldehyde and ammonium hydroxide.

23 Q. I believe you had previously testified
24 that this was being produced at the plant -- I

1 won't characterize your prior testimony.

2 What is your view as to when this was
3 produced at the plant?

4 MS. BECK: Objection.

5 If you're referring to a specific page of
6 his former testimony?

7 A. Would you give us the page?

8 Q. Let me see if I can find it.

9 MS. BECK: We don't want to go over
10 his prior testimony.

11 MS. BECK: Page 175 there is a
12 mention of it.

13 THE WITNESS: That looks like
14 exactly the same question you asked me in August
15 of 1990.

16 MS. BECK: Actually, this was June.

17 A. Page 176. My answer was starting in the
18 mid-sixties. I think I would still agree with
19 that.

20 Q. That's what I recall. Thank you.

21 I don't believe I asked you previously
22 whether or not the waste stream from the
23 production of the hexamethylenetetramine was, at
24 least in the early seventies, sent into the waste

1 treatment plant?

2 MS. BECK: I object to going beyond
3 the scope of the stipulation because we're getting
4 into factual discovery.

5 MR. FRANKEL: I think it's
6 integrally related to his opinions about what
7 types of substances were in the waste -- were in
8 the gypsum cake.

9 MS. BECK: The gypsum cake wasn't
10 manufactured until the early seventies.

11 MR. FRANKEL: I'm just talking about
12 the early seventies.

13 A. The hexamethylenetetramine was made in
14 situ and used in situ. There were no by-products
15 or waste products from the hexamethylenetetramine.

16 Q. I take it hexamethylenetetramine and the
17 formaldehyde were the two raw materials; is that
18 fair?

19 A. Yes.

20 Q. Are you saying when that was produced
21 there was no waste at all?

22 A. That's right.

23 Q. It was just put together?

24 A. It was put together, and then that was

1 moved into a storage tank and then that was used
2 to make Product 1 or Opex, the same way as if it
3 were brought in from another manufacturer.

4 Q. So your testimony is that there was not a
5 waste stream --

6 A. That's right.

7 Q. -- from the production of the
8 hexamethylenetetramine?

9 A. Right

10 Q. Now, with respect to the issue of
11 formaldehyde, I had previously asked you whether
12 you believed there was formaldehyde in the gypsum
13 cake. This is Page 178 of your prior testimony.
14 You said that you did not believe so because you
15 did not smell it coming from the gypsum cake
16 material.

17 A. Right. The gypsum had no odor. It was a
18 white free-flowing material that we filtered on a
19 rotary vacuum filter and the stuff was innocuous.
20 It had no odor whatsoever. Formaldehyde has a
21 pretty strong odor.

22 Q. Other than the fact that you didn't smell
23 the formaldehyde, do you have any other basis for
24 your view that formaldehyde was not in that cake?

1 A. I don't think the formaldehyde would
2 exist in the system as formaldehyde forever. If
3 it came down into the treatment plant, if it did,
4 if there was any formaldehyde in the treatment, it
5 would be in there with urea, with sulfuric acid,
6 and other things. It could easily form urea
7 formaldehyde compounds, which are very common,
8 which are formed in strong acid which are
9 innocuous. Formaldehyde is a pretty reactive
10 material. It's also a gas. It's not going to
11 stay around in a system like that.

12 Q. Can formaldehyde be dissolved in water?

13 A. Yes. Formaldehyde has solubility in
14 water, but you still smell it.

15 Q. So is it fair to say that it's not
16 necessarily present in a gaseous form, in that it
17 can dissolve in a water solution?

18 A. It can dissolve, but it doesn't go a
19 hundred percent into water. If you open a bottle
20 of thirty-seven percent formaldehyde solution,
21 which is an item of commerce, you would smell a
22 strong odor because there is an equilibrium. You
23 brought up before that a certain amount of the
24 formaldehyde is dissolved, but a certain amount of

1 it is in the --

2 Q. Vaporized?

3 A. In the vapor air above it all the time.

4 Q. If there are very small amounts of
5 formaldehyde dissolved in water, is it your
6 opinion that you would always be able to smell it?

7 A. Yes, you would. Formaldehyde is very
8 odoriferous.

9 Q. Even if it's in a trace amount of parts
10 per million, you think you would be able to smell
11 it?

12 A. I think you would. I don't know what the
13 ^{threshold} available is. That's probably written down
14 somewhere. I think you could smell formaldehyde
15 all the way down to one part per million. It's
16 very odoriferous.

17 Q. One part per million in the air; right?

18 A. Yes.

19 Q. But if it were --

20 A. In a liquid.

21 Q. -- parts per million in a liquid?

22 A. You would still probably be able to smell
23 it, I would think.

24 Q. Have you ever done experiments to see

1 whether that's the case?

2 A. No, I haven't done that. No.

3 Q. So what do you base that opinion on; that
4 you would be able to smell it, even if it was --

5 A. Just on the various work I've done with
6 formaldehyde over the years. I'm made
7 formaldehyde resins with phenol and urea in
8 laboratories; and a little bit of formaldehyde,
9 you can smell it forever. It's a very odoriferous
10 material. So if there was formaldehyde in that
11 system, you would smell it, because, as you filter
12 with this rotary drum filter, it picks up cake and
13 it pulls the liquid through the cake by vacuum,
14 and this is a very large system. And if you had
15 any formaldehyde in this room where this was going
16 on, the air space in the room would reek of
17 formaldehyde. This was done indoors, and we never
18 smelled any formaldehyde.

19 Q. I believe you previously testified that
20 the gypsum cake contained a certain amount of
21 liquid or water?

22 A. Yes.

23 Q. I think you said about thirty percent?

24 A. Yes.

1 Q. So if, assuming that there was
2 formaldehyde in that liquid at that point, is it
3 fair to say that some of it would be contained in
4 the gypsum sludge?

5 MS. BECK: Objection to form.

6 Q. I understand that your opinion is that it
7 wouldn't exist; but if it did exist, is it fair to
8 say that it would be contained in that sludge --

9 MS. BECK: Same objection.

10 Q. -- because of the thirty percent water
11 content?

12 A. Yes. That's fair to say.

13 Q. In the reaction between the formaldehyde
14 and the ammonium hydroxide to form the
15 hexamethylenetetramine, do you believe that all of
16 the formaldehyde would be reacted in that
17 reaction? Would it go to a hundred percent?

18 A. Yes.

19 Q. Would there be any back reaction there?
20 In other words, would there be an equilibrium
21 where you would have small amounts of the
22 formaldehyde in the ammonium hydroxide?

23 A. Possibly. By controlling the pH, you
24 would tie up all of the formaldehyde. You would

1 tie up a hundred percent the way we ran the
2 reaction, because we added ammonia to the
3 formaldehyde and ran from a low pH to a high pH.
4 But there could be some small amount of
5 formaldehyde that was going the other way. It's
6 hard to speculate at this point.

7 Q. Does hexamethylenetetramine break down
8 into formaldehyde and ammonium hydroxide?

9 MS. BECK: Objection.

10 A Q. In other words, in a reverse reaction?

11 MS. BECK: Objection.

12 A. Not normally.

13 Q. When would it do that?

14 A. I don't know. I can't think of a
15 condition.

16 Q. I believe previously you indicated today
17 that you did not believe that there would be any
18 sodium nitrite left because of the reaction with
19 the sulfuric acid; is that correct?

20 A. That is correct.

21 Q. But, again, as I asked you with respect
22 to the formaldehyde, if -- assuming for the
23 purposes of my question that not all of the sodium
24 nitrite did react with the sulfuric acid, and

1 assuming that there were trace amounts of it in
2 the liquid or in the filtrate, is it fair to say
3 that some of that would be present in the sludge
4 material because of the thirty percent water
5 content?

6 MS. BECK: Objection.

7 A. I don't think that's a fair question,
8 because I've testified previously it would all
9 react the way the treatment plant was set up.

10 Q. I understand --

11 A. It had to meet the sulfuric acid; a
12 strong acid would decompose the sodium nitrite.
13 So I don't see conditions for the question you
14 asked.

15 Q. I understand your testimony is that it
16 would react a hundred percent; that there wouldn't
17 be any left. I'm asking you -- it's a
18 hypothetical. Assuming that it didn't go to a
19 hundred percent, is it fair to say that some of it
20 would be found in the gypsum sludge because of the
21 thirty percent water content of the sludge?

22 MS. BECK: Objection.

23 Q. I understand that you disagree with the
24 hypothetical.

1 A. I don't understand the question, so I
2 can't answer it. It doesn't make sense.

3 Q. Let me try it a different way.

4 Assume that at the time you were running
5 the gypsum sludge through this filter, you have
6 the calcium sulfate and you have the liquid;
7 correct?

8 A. Yes.

9 Q. Now, assuming that there were small
10 amounts of sodium nitrite in that liquid, isn't it
11 fair to say that some of it would be found in the
12 gypsum sludge because of the thirty percent liquid
13 content?

14 MS. BECK: Objection.

15 Q. I understand that you disagree that there
16 would be any there.

17 A. How do you define small amounts? How are
18 you defining small amounts?

19 Q. Let's say parts per million range.

20 A. I would agree with that.

21 THE WITNESS: Could we take a
22 five-minute break?

23 MS. BECK: Sure.

24 MR. FRANKEL: Sure

1 (Whereupon, a brief recess was
2 taken).

3 MR. FRANKEL: Would you read back
4 the last question and answer.

5 (Whereupon, the court reporter read
6 a portion of the record).

7 A. I was agreeing that you had said if there
8 wasn't any acid present -- you were
9 preconditioning that -- if there wasn't any acid
10 present, wouldn't there be the possibility of some
11 sodium nitrite in the cake. I think that's the
12 way you phrased the question.

13 CONTINUED DIRECT EXAMINATION

14 BY: MR. FRANKEL:

15 Q. The way I phrased it, assume there were
16 some trace amounts of sodium nitrite in that
17 liquid solution, and I believe your testimony
18 previously was you didn't believe there would be
19 any because of the acid present?

20 A. Right.

21 Q. You believed it would go to a hundred
22 percent?

23 A. Right. Okay.

24 Q. Let me ask you to explain a little bit

1 further some things that you said in the prior
2 deposition about types of materials that you would
3 expect to find in the actual finished product,
4 itself, for Product 1. And again, Product 1 is
5 dinitrosopentamethylenetetramine, which we've been
6 talking about, also known as Opex, O P E X.

7 A. Are you working off a page of the
8 deposition?

9 Q. Yes. Page 2-9.

10 MS. BECK: That's the second day of
11 the deposition?

12 MR. FRANKEL: Right

13 Q. At the bottom of 2-9 and the top of 2-10,
14 I believe you indicated that if you analyzed for
15 parts per billion you would find traces of the raw
16 materials with the product. Is that still your
17 opinion?

18 A. You would have to test -- if you really
19 wanted to know the answer, you would have to run
20 the analysis. That's an opinion.

21 Q. I understand that you hadn't actually
22 tested it, but is it your opinion that that would
23 be the result, at least if you could measure it in
24 parts per billion?

1 A. Yes, in parts per billion. It's hard to
2 keep parts per billion out of anything, when you
3 start measuring in parts per billion.

4 Q. Is that because at least in parts per
5 billion, when you say a hundred percent reaction,
6 that doesn't include some parts per billion that
7 might not have reacted?

8 MS. BECK: Objection.

9 A. You're measuring such finite quantities
10 that you would have some of everything.

11 Q. Right. But just to be sure I understand
12 the reason for your opinion, is the reason for
13 your opinion that in any reaction, even if you say
14 it goes to a hundred percent, that you still are
15 going to have parts per billion that have not
16 reacted, and that's why you would expect to find
17 them?

18 A. No. That's not necessarily the answer.

19 Q. So why is it that you believe you would
20 find parts per billion?

21 A. I would say you could get some
22 contamination at that level. It's very hard to
23 keep contamination out at a level of parts per
24 billion. In parts per billion, if you washed your

1 hair this morning, you probably have formaldehyde
2 on your hair, because formaldehyde is used as a
3 preservative in everybody's shampoo. So if we
4 tested you for parts per billion, you probably
5 have formaldehyde on your hair, and I do, and he
6 does (indicating).

7 MR. GOODE: How about undertakers?

8 THE WITNESS: They have it all over
9 the place.

10 Q. You think the parts per billion, in your
11 opinion, is based primarily on the possibility of
12 contamination coming from some other source?

13 A. Yes.

14 Q. On Page 10 of this transcript you said
15 you didn't believe there would be formaldehyde in
16 the finished product because it is a gas. Is that
17 still your view?

18 A. It's a gas, and the product was also very
19 highly washed on the filter.

20 Q. Was there any liquid content in the final
21 product?

22 A. No. The product was dried.

23 Q. Is it possible for any of the
24 formaldehyde to adsorb or to adhere to any of the

1 particles of the product, itself?

2 MS. BECK: Objection.

3 Anything is possible. As one expert said,
4 a Polish pope is possible.

5 A. At what level?

6 Q. Maybe I should ask you --

7 A. What level of measurement?

8 Q. Trace amounts.

9 MS. BECK: Objection.

10 A. I don't -- you would have to test. You
11 would have to analyze. It's a question you can't
12 give an opinion on.

13 Q. NH₃; is that ammonia?

14 A. That describes the compound ammonia.

15 Q. Now, you testified that you did not think
16 NH₃ would be present, either, because it is a gas.
17 Is that still your view?

18 A. Yes.

19 Q. That's on Page 2-10.

20 A. Yes.

21 Q. On Page 2-11 you indicated that you would
22 find sodium nitrite in parts per billion. Again,
23 that's Page 2-11. Why do you believe you would
24 find sodium nitrite in parts per billion?

1 A. Basically, because it isn't a gas.

2 Q. Because it's not a gas?

3 A. Yes. Again, this is subjective. You
4 would have to analyze for this. We're dealing in
5 a realm here of La-La Land, really, sitting here
6 trying to decide whether parts per billion of
7 something would be there or not. You can't do
8 that, really. You can't be offering opinions on
9 things like that.

10 A I guess if you're a consultant, you could.
11 But I'm not a consultant.

12 Q. Well, is it not possible to make
13 predictions about whether or not substances would
14 be found in material without doing an actual test?

15 A. Not at these levels, parts per billion,
16 no. No. That's guessing. That's not science.

17 Q. Is it possible to reach a scientific
18 opinion that because of the nature of the
19 reactions involved that one would expect to find
20 something in very small amounts in the product,
21 either parts per million or billion, without
22 actually going to the lab?

23 A. I don't believe so. I really don't
24 believe so. I've been fooled too many times in my

1 career. You can make guesses, but science -- good
2 science isn't based on guessing and desk studies.

3 Q. But it is possible to make predictions
4 based on the known nature of chemical reactions,
5 is it not?

6 MS. BECK: Objection.

7 It's overly broad and unduly vague. Could
8 you be more precise in your question?

9 Q. To be more precise, with respect to this
10 particular reaction, that ^{hexamethylenetetramine} methylenetetramine, HCl
11 and sodium nitrite forming the
12 dinitrosopentamethylenetetramine and sodium
13 chloride, couldn't a chemist with knowledge of
14 these types of reactions make predictions about
15 what would be present in the final product without
16 actually going to the lab and running, I guess, a
17 spectrometer or some other lab test?

18 MS. BECK: Objection.

19 A. You could make them, but the predictions
20 would be wrong, probably. Anybody can make
21 predictions, but unless you followed it up with
22 analysis, they don't mean anything.

23 Q. Even if they're based on the known
24 properties of these chemicals and the reactions?

1 A. Without knowing the exact system, you
2 can't make those predictions.

3 Q. Let me turn now to Kempore, which is
4 Product No. 2, which is also known as
5 azodicarbonamide, as I understand it.

6 A. Is there a part in the ^{deposition} program that
7 you're looking at?

8 Q. Yes. I'll refer you to the specific
9 page.

10 MS. BECK: It's Page 45 in the first
11 deposition.

12 A. (Witness peruses document).

13 Q. First, let me just confirm that the
14 reaction here is hydrazine and urea and sulfuric
15 acid and sodium chlorate as an oxidant, going to
16 azodicarbonamide plus sodium sulfate plus sodium
17 chloride plus ammonium sulfate. Am I
18 understanding that correctly?

19 A. Well, generally. But there are two
20 separate reactions. Hydrazine, urea, the sulfuric
21 acid form the hydrazodicarbonamide, and then in a
22 second step, that is oxidized to the
23 azodicarbonamide.

24 Q. I'll call it a two-phase process?

1 A. Two-step. Don't use phase, please.

2 Q. In the first step, is there any
3 by-product of the first step?

4 A. Well, ammonia is a by-product. If the
5 ammonia is not taken from the system it forms --
6 it's in solution as ammonia ions in association
7 with sulfate ions.

8 Q. Was the ammonia taken from the system?

9 A. At what period of time?

10 Q. In the early seventies.

11 A. At some point they started doing that,
12 and I'm not sure when. The original process was
13 -- no, that the ammonia was not removed from the
14 system.

15 MS. BECK: Page 169.

16 Q. I recall you indicating that you began to
17 recover it, but I had forgotten when.

18 A. That happened sometime in the seventies.

19 Q. When you started to recover the ammonia?

20 A. Yes.

21 Q. Can you place it late seventies? Early
22 seventies? Mid-seventies?

23 A. I would say sometime in the
24 mid-seventies.

1 Q. Do you know whether it was before or
2 after the time that the Charles George Trucking
3 Company was picking up the gypsum cake?

4 MS. BECK: Objection.

5 A. Probably a little bit after. I can't be
6 -- I'll take that back. I can't be sure. It
7 could have been at the same time or a little bit
8 after. I'm hazy on that date. It could have
9 happened at the same time or in the same time
10 period.

11 Q. I believe you previously testified that
12 you thought that the Charles George Trucking
13 Company picked up the gypsum cake, I think, around
14 '71 or '72 for an eighteen-month period?

15 A. I would say '72 to '73 probably, after
16 re-reading that.

17 Q. '72 or '73?

18 A. Yes, in that period, I would say.

19 Q. On Page 46 of the first volume of your
20 deposition you testified that you did not believe
21 that there would be any ammonia; that it would all
22 mix with sulfuric acid to form ammonium sulfate?

23 A. Yes. There was never any ammonia odor
24 when we neutralized the effluent in the treatment

1 plant because you weren't bringing it up to a high
2 enough pH to release ammonia from the system.
3 Seven to 8 isn't a strong enough basic condition
4 to release ammonia from ammonium sulfate solution.
5 We never had any formaldehyde and we never had any
6 ammonia odors in the plant.

7 Q. So what about ammonium that might just
8 have been in solution, but not as ammonium
9 sulfate, just as the ammonium ion?

10 A. You would have had ammonia and ammonia
11 sulfate ions in solution. You couldn't have any
12 hydroxide at that low a pH. You would have to get
13 up to a pH of 10 or 11 to form ammonium hydroxide.
14 You just don't have enough, strong enough base at
15 a pH 7 to 8 to do that.

16 Q. I take it that at least after the
17 addition of the lime that it was neutral to about
18 a 7 or 8 pH?

19 A. Yes; but that's not strong enough
20 basic-wise to form an ammonium hydroxide solution
21 and free ammonia. You would still have ammonium
22 sulfate, ammonium ions, and sulfate ions. If you
23 took it to dryness at pH 7 to 8, you would find a
24 precipitate coming out of ammonium sulfate. So

1 you would have ammonium sulfate if you took it to
2 dryness.

3 Q. Would you have some hydroxide ions in the
4 solution in addition to ammonium ions?

5 A. No. Just ammonium sulfate. If you took
6 the gypsum with the solution occluded to it to
7 dryness, you would have ammonium sulfate with the
8 gypsum.

9 Q. When you say the liquid occluded to it --

10 A. That's the thirty percent. In that
11 mixture you would find some ammonium sulfate if
12 you took it down to dryness.

13 Q. At what pH do you think you would start
14 to have ammonium hydroxide?

15 A. You would have to get up to 10 probably
16 -- 10 to 11.

17 Q. Is it your view that you wouldn't have
18 small amounts of it at a lower pH? In other
19 words, it wouldn't be an issue of how much; there
20 just would be, in your opinion --

21 A. You wouldn't have any. In my opinion,
22 you wouldn't have any.

23 Q. And that's based on the presence of the
24 H₂SO₄?

1 A. Right; the sulfate ions and the hydrogen.

2 Q. Page 168 of the testimony you indicated
3 that sodium bromide was a catalyst?

4 A. Yes.

5 Q. And that sodium sulfite was used with --

6 A. Say that again?

7 Q. The sodium bromide was a catalyst?

8 A. For the oxidation phase, yes.

9 Q. And that sodium sulfite was used with the
10 sodium bromide, but I don't believe you indicated
11 how it was used. Could you describe that for me a
12 little bit further?

13 A. Sodium bromide was used in catalytic
14 amounts, small amounts to effect the oxidation of
15 the hydrazodicarbonamide with sodium chloride.
16 The reaction actually worked by the chlorate
17 oxidizing sodium bromide to free bromine.

18 The bromine actually oxidized the
19 hydrazodicarbonamide. And in oxidizing it, it was
20 reduced to sodium bromide again. Then more
21 chlorate oxidized more sodium bromide. And this
22 repeated itself in molecule reactions over and
23 over and over until all of the
24 hydrazodicarbonamide was oxidized to the

1 azodicarbonamide.

2 At the end of the reaction, the last final
3 molecule, you had free bromine in the system, and
4 there is no molecule of hydrazodicarbonamide to be
5 oxidized. At that point, sodium sulfite was added
6 to reduce the bromine back to sodium bromide,
7 because we didn't want free bromine in the system.
8 Bromine is a little bit noxious to have around.
9 It's also corrosive. Whereas, sodium bromide is
10 innocuous.

11 The reaction was followed on an instrument
12 and at the end point -- and you could also see
13 this visually, too, because the batch would start
14 to foam when you got to free bromine. And we
15 added sodium sulfite to take that back to sodium
16 bromide.

17 Q. Do you have an opinion with respect to
18 the reactions that might take place between sodium
19 chlorate and hydrazine in reaction?

20 MS. BECK: Objection.

21 A. Would there be a reaction?

22 Q. Right.

23 A. There would be a reaction between the
24 system of sodium chlorate and bromine and

1 hydrazine.

2 Q. What would that reaction be?

3 A. The bromine would oxidize the hydrazine,
4 and the hydrazine would reduce the bromine to the
5 bromide. So if you had any hydrazine available,
6 it would disappear.

7 Q. If bromine were not present, assume you
8 just had a solution of hydrazine and sodium
9 chlorate, would there be a reaction?

10 A. Yes. The chlorate would do the same
11 thing. It would -- chlorate is a strong oxidizing
12 agent. Hydrazine is a very strong reducing agent.
13 So you have a strong oxidizing agent reacting with
14 a strong reducing agent.

15 Q. Let me refer you to 2-14.

16 A. (Witness complies with request).

17 Q. My questions at this point were about the
18 Kempore product, itself -- the finished product.
19 And I had asked you whether or not you would
20 expect to find hydrazine, the bottom of Page 13,
21 and the top of Page 14. You indicated at a trace
22 level?

23 A. Yes.

24 Q. I was wondering --

1 A. I looked at this after my deposition.
2 When I first came in for the first and second
3 deposition I wasn't sure what chemistry you were
4 going to talk about, and it was difficult to
5 review it. After this deposition I started
6 thinking about this, and I came to the conclusion
7 that there couldn't be any hydrazine left in the
8 system because of the two-stage reaction. And I
9 actually sat down and drew up the equations that
10 proxed this.

11 Q. You're saying now that you no longer --

12 A. There wouldn't be any hydrazine possible
13 to be available with the final product.

14 Q. Why do you say that?

15 A. Because all of the hydrazine would be
16 oxidized as soon as you started adding the
17 oxidizing system to the hydrazodicarbonamide
18 system. As long as you brought in the sodium
19 chlorate and the bromine, the sodium bromide, they
20 would preferentially attack the hydrazine, which
21 is a strong reducing agent, before they would
22 begin oxidizing the hydrazodicarbonamide which is
23 a less strong reducing agent. A strong oxidizing
24 agent and a strong reducing agent will go together

1 very quickly and react because they're very
2 reactive, before a strong oxidizing agent will
3 oxidize a weaker reducing agent, such as the
4 hydrazodicarbonamide.

5 Q. When you had previously testified that
6 you believed there would be trace amounts, what
7 were you basing that on?

8 A. I had forgotten the chemistry of the
9 system.

10 Q. So your testimony now is that since your
11 last deposition you've looked at it again and
12 decided that there would be no hydrazine?

13 A. That's right. I wrote a note on this to
14 Jeffrey Bartlett, our in-house counsel.

15 MS. BECK: We don't want to discuss
16 anything that you communicated to counsel.

17 Q. You said you wrote an equation, or you
18 did some computations?

19 A. Yes.

20 Q. Can you tell me --

21 A. Hydrazine -- hydrazine plus bromine would
22 give you nitrogen plus sodium bromide. So the
23 hydrazine would be oxidized to free nitrogen. The
24 bromine would be reduced from the zero state to

1 one negative state of the bromide. So I'm
2 absolutely sure there would be no hydrazine left
3 in the system.

4 Q. Not even in parts per million?

5 A. Not even in parts per million.

6 Q. Or parts per billion? What about parts
7 per billion?

8 A. No, I don't believe there would be any.

9 Q. You previously testified that there would
10 be urea in trace amounts in the final product?

11 A. Possibly, yes.

12 Q. You didn't indicate the amount last time.
13 I was wondering if you had any opinion as to the
14 amount?

15 A. It would be small amounts, because urea
16 is one of the most soluble of all organic
17 compounds. These products are filtered and washed
18 with a lot of wash water, so you would have very
19 small amounts of urea.

20 Q. You also indicated or testified
21 previously that there would be small amounts of
22 sodium bromide, but you did not indicate how much?

23 A. That would be parts per trillion or parts
24 per quadrillion or something like that; because

1 sodium bromide was only used at a tenth of a
2 percent level. A tenth to .05 percent, so, you're
3 talking very small amounts at that point.

4 Q. Finally, you mentioned sodium sulfite in
5 trace amounts, but you didn't indicate an opinion
6 as to how much.

7 A. That would be the same as the bromide
8 because it was used in molecular quantities to
9 reduce the free bromine at the end of the
10 reaction.

11 Q. I'm going to ask you some questions now
12 focusing on the gypsum cake, itself.

13 When you previously testified, I'm talking
14 now about Pages 85 and 86.

15 MS. BECK: In the first deposition?

16 MR. FRANKEL: Right.

17 Q. You indicated that you thought that there
18 would be trace amounts of aluminum hydroxide in
19 the gypsum cake. I was wondering whether you had
20 an opinion as to the amount?

21 A. Wasn't this coming off the analysis that
22 was given in one of the documents?

23 Q. Yes.

24 A. Can you produce that?

1 Q. Yes, I can.

2 MR. FRANKEL: Do you have a copy of
3 that?

4 MS. BECK: Not a clean copy.

5 MR. FRANKEL: I think I may have a
6 clean copy.

7 MS. BECK: It's Exhibit 5.

8 Q. You indicated that you believed that
9 there would be trace amounts of aluminum
10 hydroxide?

11 A. There could be.

12 Q. But I did not ask you at what levels you
13 thought that would be. Do you have an opinion on
14 that?

15 A. I didn't do this analysis. If you're
16 asking me could it be there; it could or it could
17 not. But I didn't do this analysis. I don't know
18 where the analysis came from.

19 Q. Do you have any opinion as to whether or
20 not this was an analysis of an actual sample of
21 gypsum cake, either from the plant or from the
22 pilot plant?

23 MS. BECK: Objection.

24 A. I don't believe it was an analysis, but

1 that's an opinion. My opinion is that this was a
2 desk study that was made of what might have been
3 in the gypsum.

4 Q. When you say a desk study, do you mean
5 calculations?

6 A. Calculated out, yes.

7 Q. What is your basis for that opinion; that
8 it's a desk study?

9 A. I think it was probably the timing,
10 because this tied in with the date of when the
11 engineering was being done with the plant -- for
12 the plant. And in order to finish the design, the
13 State had to be involved, and the State -- the
14 Commonwealth had to ask, well, what are you going
15 to have in the gypsum? And I don't think any --
16 the plant certainly wasn't running at this point,
17 and I don't think any simulations were done.

18 Q. Are you aware as to the nature of the
19 one-month study by an independent laboratory which
20 is referred to on Page 1?

21 A. I don't know what that means.

22 Q. Do you have any knowledge as to whether
23 or not a pilot test was done, or a laboratory
24 simulation was done?

1 A. No. And the one-month study by a
2 laboratory, could have been a desk study, in my
3 view, the way I read that.

4 Q. You believe that is not necessarily
5 referring to an actual simulation of the process?

6 A. That's my belief. It could have been a
7 simulation.

8 Q. Just so I'm sure your testimony is clear,
9 you don't know either way which it was; is that
10 right?

11 A. That's right. So I don't know that this
12 is a true chemical analysis or a simulation
13 analysis.

14 Q. Do you even know when it says
15 "Independent Laboratory," which laboratory it was?

16 A. No. No.

17 Q. Well, going back to your indication that
18 there could be trace amounts of aluminum
19 hydroxide, when you answered that previously, did
20 you have a particular reason in mind as to why
21 there might be trace amounts of aluminum
22 hydroxide?

23 MS. BECK: Objection.

24 I think he said he was testifying about

1 what's been marked as Plaintiffs' Exhibit 5 in his
2 first deposition.

3 MR. FRANKEL: Right, he was. I
4 asked him whether he had an opinion as to whether
5 or not that was actually in there, and he said,
6 trace amounts.

7 A. What page was that on?

8 MS. BECK: Eighty-six.

9 A. Would you repeat that last question?

10 MR. FRANKEL: Please read it back.

11 (Whereupon, the court reporter read
12 a portion of the record).

13 A. Do you want to restate the question? I'm
14 still confused.

15 BY: MR. FRANKEL:

16 Q. I believe your prior testimony was that
17 there could be trace amounts of aluminum hydroxide
18 in the gypsum cake. What I'm asking you now is,
19 do you have a particular reason for saying that
20 there could be trace amounts of aluminum hydroxide
21 in the gypsum cake?

22 MS. BECK: Objection.

23 A. Well, aluminum salts are used in a lot of
24 waste treatment plants as clarifying agents,

1 precipitating agents.

2 Q. Was aluminum hydroxide used at the
3 treatment plant at the Wilmington facility?

4 A. No, it wasn't used, but I think this
5 predated -- I'm sure it predated the start of the
6 plant and the needs for the plant. The gypsum
7 precipitated very efficiently, and there were no
8 additives required.

9 Q. So as you look at it, your prior answer
10 of trace amounts, you don't have any particular
11 reason for saying that there would be trace
12 amounts?

13 A. Not that I can see.

14 Q. Now, on Page 87 the question was, "Was
15 formaldehyde one of the waste products?" Answer,
16 "Traces of formaldehyde were."

17 A. Well, it's listed here. I think I'm
18 saying it was listed in here as a trace.

19 Q. So you're saying that your prior
20 testimony was --

21 A. We've got to look at this.

22 Q. I asked you about salt and asked, "Would
23 you expect to find that in trace amounts?" And
24 the answer: "Yes." Question: "How about calcium

1 chloride?" Answer: "It could have been there."
2 The question: "Formaldehyde?" Then the answer:
3 "I would be surprised. Formaldehyde is a gas. It
4 doesn't usually stay around in the system."
5 Question: "Was formaldehyde one of the waste
6 products?" Answer: "Traces of formaldehyde were."
7 Question: "When you say trace again, you can't
8 tell me how much?" Answer: "No."

9 With respect to these traces of
10 formaldehyde as being one of the waste products --

11 A. I think the word traces isn't defined.
12 It isn't defined here.

13 Q. How would you define trace when you were
14 using it in this prior testimony when you say
15 traces?

16 A. Traces is detectible, but not
17 quantifiable. So it could be one part per
18 billion, but that it's so small that you can't
19 measure how much you have in there. And that's
20 the way I defined it previously and that's the way
21 I define it now.

22 Q. Now, in the early 1970s, would trace have
23 a different meaning in terms of analysis as it
24 would today?

1 MS. BECK: Objection.

2 A. I don't know.

3 Q. Did you not previously testify that the
4 ability to detect small amounts has essentially
5 gotten much better in the last decade or so?

6 A. It has, yes.

7 Q. So if someone was using the word trace,
8 in, say, 1940, that might have a different meaning
9 than someone using trace in 1991?

10 MS. BECK: Objection.

11 Are you asking him what somebody else means
12 when they use a term? I'm going to object to
13 that. It's too speculative.

14 A. To me, a trace is detectible, but not
15 quantifiable. So that runs over a whole range.

16 What the writer of this meant by trace, I
17 have no idea. I have absolutely no idea. I think
18 we're stumbling over these hurdles.

19 MS. BECK: When you refer to "this,"
20 you're talking about Exhibit 5 to your first
21 deposition?

22 THE WITNESS: Yes. The analysis in
23 the letter.

24 Q. Turning, also on Page 87 with respect to

1 sodium nitrite, you say "Anything could be there
2 under a trace, depending on how the analysis is
3 done."

4 Again, when you use the word trace there,
5 you mean detectible, but not knowing how much?

6 A. Absolutely. There are some qualitative
7 methods that detect down to parts per billion, but
8 at the same time, you can't quantify by that same
9 test as to how many parts per billion you have.
10 So it's very dangerous. Sometimes people misuse
11 these analyses.

12 Q. In your view when something is detected
13 at a trace level, does that mean it's present in
14 some amount, but the instrument is just unable to
15 tell you the specific number in parts per million
16 or parts per billion or whatever calibration is
17 needed?

18 MS. BECK: Objection.

19 A. In some cases that's true. I've seen
20 people report twenty-five parts per billion when
21 the method is only good down to fifty parts per
22 billion. And I've seen people report this in the
23 literature.

24 Q. Now that you mention literature, I don't

1 know that I had asked you earlier today; have you
2 written any articles or publications?

3 A. My master's thesis was published in 1956.

4 Q. Other than your master's thesis, have you
5 written any articles for publication since then?

6 A. No, I don't believe -- well, not that I
7 can recall.

8 Well, I take that back. I published
9 something in the sixties, and I can't remember
10 what it was, but I did publish something in the
11 plastics -- in the plastics-type processing. I
12 think it was on differential thermal analysis.

13 MR. FRANKEL: Off the record.

14 (Discussion off the record).

15 (Whereupon, a luncheon recess was
16 taken).

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1 AFTERNOON SESSION

2 MR. FRANKEL: Would you please read
3 back the last question and answer.

4 (Whereupon, the court reporter read
5 a portion of the record).

6 MR. FRANKEL: I'd like to mark as
7 Exhibit 3 an environmental disclosure -- called an
8 "Environmental Disclosure," dated July 23, 1990.
9 This is an attachment to what I believe to be an
10 agreement of sale entered into between Stepan and
11 Olin Corporation with respect to the --

12 THE WITNESS: I think it was 1980.

13 MR. FRANKEL: Excuse me, 1980.

14 It's called "Environmental Disclosure."
15 There is an introductory page and two pages after
16 that. Then there is something that says Exhibit
17 3.06, and -- I see what happened here. I think
18 some of the pages have been copied twice. So I
19 think I only need to mark Exhibit 3.06 to that
20 sale agreement, which is called Environmental
21 Disclosure. And the disclosure, itself, is six
22 pages.

23 MS. BECK: Is this a document that
24 wasn't marked in any of his last depositions?

1 MR. FRANKEL: That's right.

2 MS. BECK: I'm going to object to
3 it. I'll look at it before we go further, but if
4 you want to mark it, then I'll look at it.

5 (Exhibit 3 marked for identification
6 now).

7 CONTINUED DIRECT EXAMINATION

8 BY: MR. FRANKEL:

9 Q. (Handing).

10 A. (Witness peruses document).

11 Q. Mr. Riley, have you ever seen this
12 before?

13 MS. BECK: He hasn't finished
14 looking at it.

15 A. (Witness peruses document).

16 Yes, I've seen it before.

17 MS. BECK: I'm going to object on
18 the record to this document being marked as an
19 exhibit or to any reference to it to the extent
20 that it goes beyond our stipulation which has been
21 marked as Exhibit 1.

22 MR. FRANKEL: I don't believe it
23 goes beyond in the sense that I'm only going to
24 ask him about -- well, I'm going to ask him about

1 information in this document that relates to his
2 expert testimony on what types of materials were
3 contained in certain products or in the waste from
4 those products. So I think the document is a
5 document that's relevant to his expert opinion in
6 the case.

7 Plus, it appears to be a document that he,
8 himself, was involved in, but obviously the
9 witness will tell me whether or not that is the
10 case.

11 Q. Mr. Riley, were you involved in preparing
12 this document?

13 A. Yes.

14 MS. BECK: Note my continued
15 objection to this line of questioning to the
16 extent that it goes beyond our stipulation which
17 has been marked as Exhibit 1, so I don't have to
18 keep objecting.

19 Is that acceptable, Mr. Frankel?

20 MR. FRANKEL: Fine.

21 Q. Mr. Riley, did you prepare this document?
22 Were you involved in the preparation of this?

23 A. Yes.

24 Q. What is this document, as you understand

1 it?

2 A. This is an environmental disclosure
3 statement that was prepared at the time of the
4 sale of the plant site in Wilmington to the Olin
5 Corporation.

6 Q. How did you participate in the
7 preparation of this?

8 A. Well, I had been associated with the site
9 for a number of years and I was asked to do this
10 as the Stepan expert.

11 Q. Now, I see that Ron McBrien and Walter
12 Beck are also listed on the first page?

13 A. Yes.

14 Q. Did they also assist in the preparation
15 of this, or did you do it on your own?

16 A. They were consulted, I believe.

17 Q. You consulted them?

18 A. I believe so. They were still in
19 Wilmington and I was in Chicago at this time.

20 Q. I refer you to Page 2 of the exhibit
21 where it says "Manufacturing Processes Conducted
22 at the Wilmington Site, Sellers' Best Knowledge."

23 MS. BECK: Actually, it's Page 3.

24 MR. FRANKEL: Page 3 of the entire

1 exhibit.

2 Q. Is this Opex the product that we
3 discussed earlier today?

4 A. It certainly looks like it.

5 Q. I note that under the by-products there
6 is sodium nitrite listed, and then it's crossed
7 out. Nitrite is crossed out and nitrate is
8 written in. Can you explain that?

9 A. No, I can't.

10 Q. Do you believe that sodium nitrate is, in
11 fact, the by-product as opposed to sodium nitrite?

12 A. Nitrite -- neither would be a by-product,
13 actually.

14 Q. Do you know why they're listed here?

15 A. Well, probably to indicate that there
16 could be some sodium nitrite coming out of the
17 pipe from this building by process, because these
18 are being listed by process. But that doesn't go
19 against my previous comments about what happened
20 when it got to the combined -- when it got
21 combined in the treatment plant. These are listed
22 by process.

23 Q. So is it your opinion that sodium nitrite
24 or sodium nitrate would have come out of the pipe

1 from this building, and then it would have been
2 eaten up, so to speak, when it reached the
3 sulfuric acid?

4 A. Yes.

5 Q. Would it be sodium nitrite or sodium
6 nitrate?

7 A. It would be nitrite.

8 Q. So you believe this is incorrect where it
9 says sodium nitrate?

10 A. Yes. I don't know who did that. I
11 didn't do it.

12 Q. Below that it says formaldehyde.

13 Is it your opinion that there would have
14 been formaldehyde in the pipe coming out of this
15 building, but that it would have, again, been
16 eaten up, so to speak?

17 A. Or reacted with urea; that it would not
18 be present by the time you were filtering gypsum
19 in the treatment plant. That's my -- that is my
20 feeling.

21 Q. Is it your view it would have come out of
22 the pipe just at this one process before it
23 reached the other effluent, so to speak?

24 A. Yes.

1 Q. Can I ask you to look at B on the next
2 page which is "Kempore, (azodicarbonamide)"; is
3 this the same as the product we were talking about
4 earlier today?

5 A. Yes.

6 Q. Product No. 2?

7 A. Yes.

8 Q. I note that under by-products it lists
9 sodium bromide?

10 A. Yes.

11 Q. Do you believe that to be correct?

12 A. Yes.

13 Q. Would sodium bromide have been part of
14 the effluent that would have gone out of the pipe
15 from this particular process?

16 A. Yes, it would.

17 Q. Under C, "Hydrazine" --

18 MS. BECK: Just to clarify the
19 record, you're talking about just a by-product of
20 that particular process?

21 MR. FRANKEL: Correct, a by-product
22 of the process.

23 THE WITNESS: Yes.

24 Q. Do you have an opinion as to what would

1 happen to the sodium bromide after it mixed in
2 with the other waste streams?

3 A. I think it would stay as sodium bromide
4 and just go into the sewer system. Sodium bromide
5 is very soluble in water.

6 Q. When you say into the sewer system --
7 well, at the time they had the waste treatment
8 plant would it have gone into the waste treatment
9 plant?

10 A. Yes; and it would have stayed in the
11 liquid side and continued on.

12 Q. So to the extent that the gypsum cake was
13 thirty percent liquid, is it your opinion that
14 some of the sodium bromide would be part of the
15 gypsum sludge?

16 A. Yes.

17 Q. Under hydrazine, it indicates under the
18 note that this process will shut down in the fall
19 of 1970. Was hydrazine then purchased from Olin
20 Corporation?

21 A. Yes.

22 Q. Does that refresh your recollection any
23 concerning the date there?

24 A. I think I testified to those exact dates

1 this morning.

2 Q. Did you say it was 1970?

3 A. '63 to '70; I'm pretty sure.

4 Q. I'd like the witness to take a look at
5 what was previously marked as Kendall Exhibit 13.

6 MR. FRANKEL: I doubt that it's
7 necessary to mark it since it's already an exhibit
8 in the Kendall deposition.

9 MS. BECK: Let me object on the same
10 basis that it goes beyond the stipulation and note
11 my continuing objection as to any questions with
12 reference to a letter dated December 7th, 1990
13 from me and the attachments to that letter.

14 MR. FRANKEL: My position would be
15 the same as I indicated previously; that the
16 documents here are directly related to the expert
17 opinion of Mr. Riley with respect to the types of
18 materials that would be found in the products
19 produced by the Wilmington facility. Therefore, I
20 believe it doesn't violate the stipulation to ask
21 him about these particular documents, as they're
22 germane to his expert testimony.

23 Q. Mr. Riley, putting aside the letter from
24 counsel to myself, the sheets called Stepan

1 Chemical Company, Product Composition and
2 Specifications; have you ever seen such sheets
3 before (handing)?

4 A. (Witness peruses documents).

5 Yes.

6 Q. Can you tell me what these are? What do
7 these show?

8 A. These are specifications sheets that
9 define the products that were made in the Stepan
10 plant.

11 Q. Were these prepared by Stepan employees?

12 A. Yes.

13 Q. Is there any particular person that
14 prepared them?

15 A. They're normally prepared in Quality
16 Assurance at the direction of the Marketing
17 Department and the Manufacturing Department. They
18 both have to agree on them, usually. But they're
19 usually prepared in the Quality Control or in
20 Quality Assurance.

21 Q. Were you involved in that?

22 A. Well, I signed some of them, as you can
23 see, but I wasn't preparing them. I was
24 coordinating them.

1 Q. Were these sent to customers that were
2 interested in buying the products?

3 A. Yes.

4 Q. Is that the idea?

5 A. Yes. They represent a technical bridge
6 or a contract basis for the customer to -- for the
7 customer and you to determine what you're going to
8 deliver to them, rather than saying, I'm
9 delivering a thousand pounds of Kempore, this ties
10 down by specifications what you're delivering.
11 And it also gives the test numbers so that there
12 is no doubt about how each side is testing the
13 material.

14 Q. Where is the test number?

15 A. Over on the left side there (indicating),
16 it says "Test Number, 309.5, 401." Those refer to
17 Stepan quality control tests.

18 Q. That's an actual test that was done on a
19 sample?

20 A. No. That's a test method, but it tells
21 us how we're doing the test.

22 Q. Right.

23 A. So that this little thing we had going on
24 about traces and so forth, you have to define how

1 you're doing a test in order to have an analysis
2 that can be compared to somebody else's analysis.
3 So if a customer were to get a sample of our
4 product, in order for him to compare with us the
5 results, he would have to do the test by the same
6 method. So these are the test methods on the
7 left. Then the limits or the specifications are
8 on the right.

9 Q. Does this mean that the batch that you
10 sent to that customer, that you actually tested
11 that batch?

12 A. No.

13 Q. Or was that a representative sample?

14 Do you send this to all the customers?

15 A. If a customer starts buying the product
16 you would send this specifications sheet. It goes
17 to his laboratory. If he wants to test the
18 product he's buying from you, it tells him how to
19 do it and what the limits should be.

20 Q. I see.

21 Where it says "Composition" as opposed to
22 "Specifications," what's the difference between
23 those two?

24 A. Well, the composition is the chemical

1 nature of the product. Whereas, specifications
2 are physical constants and chemical tests that
3 define the product.

4 Q. Then "Informative Data" would be -- I see
5 APD there. What is that?

6 A. That's a measurement of the average
7 particle size.

8 Q. Is that average particle diameter?

9 A. That's exactly what it is.

10 Q. Let me ask you about Opex-93, which is
11 about the tenth one in here?

12 A. (Witness peruses document).

13 Q. Do you see that one?

14 A. I have it.

15 Q. How does this differ from, or did it
16 differ from Opex, in general? We talked about
17 Opex earlier today.

18 A. Well, Opex was sold in 93 percent active,
19 like Opex-93. There was also an Opex-40.

20 Q. I see. It's the percentage of the
21 product that is Opex?

22 A. Yes. We had an Opex-40 that we used to
23 blend Opex-93 with silica.

24 Q. Underneath "Specifications," it indicates

1 first of all, the DNPT content; what would that
2 be?

3 A. That's the actual concentration of the
4 chemical in the product; 92-95.

5 Q. I see.

6 Going further down it says "Screen?"

7 A. Screen.

8 Q. Can you tell me what that is?

9 A. That's a measure; it says "100% through
10 20." That would be twenty microns.

11 Q. Does that mean that all the particles
12 were less than twenty microns?

13 A. I would have to see that 309.1 and review
14 what that was. I couldn't tell you right now.

15 Q. But the 20 means twenty microns?

16 A. I don't know that. I don't know how you
17 would know that either. It just says "20."

18 Q. But whatever the "20" is, it's 100%
19 through 20; whatever that is, inches, feet?

20 A. It might be inches, feet, but I don't
21 know what that is. We would have to see 309.1 to
22 know what that was.

23 Q. So assuming the 309.1 meant twenty
24 microns, would that mean that the particles were

1 smaller than twenty microns in diameter?

2 A. Yes, it would.

3 Q. I believe earlier today when we discussed
4 Opex, you indicated that a filter was used at the
5 time of the precipitation, I think you said
6 twenty-five microns -- correct me if I'm wrong --
7 and that you thought the average particle was
8 around fifty microns?

9 A. That was my recollection.

10 Q. Does this indicate that the particles
11 were smaller than that?

12 A. I don't know what this is. I don't have
13 309.1. Until we do, I couldn't tell you what that
14 referred to.

15 Q. Assuming for the purposes of my question
16 that 309.1 is microns --

17 A. I think that's a bad assumption. I think
18 that's a twenty mesh screen, which is entirely
19 different than twenty microns.

20 Q. Twenty mesh; what would twenty mesh be?

21 A. I think a 325 mesh -- I've forgotten. I
22 don't know. But I don't think that's microns.
23 You couldn't see a twenty-micron screen. I think
24 fifty is about the visible, as I remember.

1 Anything smaller than fifty microns, you couldn't
2 see, so I don't think -- I think that refers to
3 mesh. I think a 325 mesh screen is about equal to
4 fifty microns.

5 Q. A 325 mesh?

6 A. Yes. So if this says through twenty
7 mesh, then that's pretty coarse stuff. And that
8 would all end up on my filter and not go through
9 it, as you might have surmised, if that was twenty
10 microns; right?

11 Q. So the 325 mesh has --

12 A. It's about fifty microns. A 325 mesh
13 screen is about fifty microns.

14 Q. So a twenty mesh screen has a wider
15 opening?

16 A. Yes, a twenty mesh screen is a lot
17 coarser.

18 Q. It's how many something per inch or
19 whatever?

20 A. Yes.

21 Q. So the higher the number, the lower the
22 diameter of the holes --

23 A. Absolutely.

24 Q. -- in the filter?

1 A. Absolutely.

2 Q. Let me ask you to turn to -- it's a ways
3 down -- it's one of the Actafoams. It's only
4 about five from the bottom.

5 A. There are numbers up in the right-hand
6 corner. I don't know -- maybe they're not in
7 order.

8 Q. The Actafoam is about six from the very
9 bottom, Actafoam R-3?

10 A. That was a standard product.

11 Okay.

12 Q. When you previously testified, this was
13 at 182 of your prior testimony, for Actafoam R-3
14 you indicated that the zinc oxide reacted with
15 2-ethylhexoic acid to form zinc ethyl hexoate. Am
16 I understanding that correctly?

17 A. Zinc 2-ethyl hexoate.

18 (Witness confers with attorney).

19 A. Counsel pointed that out; that was R-5 in
20 the previous testimony.

21 Q. Page 181 is where we start to talk about
22 it, Actafoam R-3. You say that the DOP is
23 di-2-ethyl hexyl phthalate?

24 A. Which is the same as dioctyl phthalate.

1 Di-2-ethyl hexyl phthalate and dioctyl phthalate
2 are used interchangeably.

3 Q. Now, I think on Page 182 you indicate
4 that the reaction is the zinc oxide reacted with
5 the 2-ethylhexoic acid to form zinc ethyl hexoate?

6 A. Yes.

7 Q. Is that true for all the Actafoam
8 products, R-1, R-3, R-5, and XR-34?

9 A. I'm not sure of that. Are you asking,
10 was this a common denominator for all?

11 Q. Yes; the zinc ethyl hexoate being formed.

12 A. I'm not sure of that. I couldn't answer
13 that question.

14 Q. How about in particular for R-3?

15 A. For R-3, it's true.

16 Q. Now, zinc 2-ethyl hexoate, do you know
17 the formula for that? How would that be
18 described?

19 A. Well, the 2-ethyl hexoate and the octyl
20 are the same. Dioctyl is a C8 compound. And a
21 2-ethyl hexoate is -- hex is 6 and ethyl is 2. So
22 it's 2 plus 6 is 8. So they're both a C8 acid
23 compound.

24 Q. Is the zinc part of that compound?

1 A. Yes.

2 Q. What does it bind with?

3 A. It binds initially with the 2-ethylhexoic
4 acid that has been neutralized by the zinc
5 compound to form the zinc ^{salt} solid, zinc 2-ethyl
6 hexoate.

7 Q. And that zinc ^{salt} solid is a zinc compound?

8 A. Yes.

9 Q. Now, potassium oleate indicates eighteen
10 percent by weight and dioctyl phthalate,
11 twenty-three percent by weight.

12 Can you tell me what potassium oleate is?

13 A. It's a salt. Potassium salt of oleic
14 acid.

15 Q. Do you believe that that was in the
16 Actafoam R-3?

17 A. Yes. It was added in to add some
18 potassium to the compound because you wanted the
19 presence of zinc and potassium. So the zinc was
20 reacted with the 2-ethylhexoic acid and then the
21 potassium oleate was added in directly.

22 Q. I take it it didn't react with the zinc?

23 A. No.

24 Q. It was added to be part of the product

1 composition?

2 A. Right.

3 Q. The last one listed is dioctyl phthalate?

4 A. Yes. That didn't react either. That was
5 just a carrier for this compound so that it would
6 be a liquid compound that would be compatible with
7 vinyl compounds.

8 Q. Was dioctyl phthalate a liquid?

9 A. Yes; and it's a plasticizer for vinyl
10 resins, so that's why it was chosen as a carrier.

11 Q. So the other two materials were poured
12 into the dioctyl phthalate?

13 A. The zinc was reacted with the
14 2-ethylhexoic acid in the presence of the dioctyl
15 phthalate, and then the potassium oleate was
16 added. That's the way it actually was done.

17 Q. Let me ask you to turn a little bit
18 further down to Actafoam R-34?

19 A. XR-34.

20 Q. Was this also a product of the Stepan
21 Company?

22 A. Yes.

23 This was never a big seller. This was
24 always kind of a new market development, whereas

1 the Actafoam R-3 was a very solid, established
2 product.

3 Q. The composition here, we've talked about
4 the zinc 2-ethyl hexoate and the potassium oleate;
5 was lead octoate added to the product?

6 A. In very small amount; .30 it says.

7 Q. Why was that added?

8 A. To give additional activation with
9 azodicarbonamide.

10 Q. But I take it it didn't react with it?

11 A. It was in the system.

12 Q. What is lead octoate?

13 A. It's a salt of lead and 2-ethylhexoic
14 acid. The same as the zinc is a salt of zinc and
15 2-ethylhexoic acid.

16 Q. Dioctyl phthalate we've discussed.

17 Mono --

18 A. Monoethanolamine.

19 Q. What is that? That is a pretty high
20 percentage.

21 A. That's an amine type of organic compound.
22 It's an amine with an ethanol with a hydroxyl^y
23 group on it. We called that MEER, M E E R, for
24 monoethanolamine.

1 Q. Do you know if Actafoam R-34 is the same
2 as Actafoam XR-34?

3 A. Yes, that's the same product.

4 Q. Zinc oxide is the next material listed.
5 Was that added to the --

6 A. It was added to react -- on this product,
7 I guess there was some zinc oxide added into it.

8 Q. Separately from the zinc?

9 A. Yes, I think so.

10 A Q. Could I ask you to look at the very next
11 page. This seems to be Actafoam F-2?

12 A. That was a dry blend of zinc stearate and
13 sodium stearate.

14 Q. What is a stearate?

15 A. That's a salt of stearic acid.

16 Q. Would it be a zinc compound involving a
17 salt formation?

18 A. Zinc oxide plus stearic acid would give
19 you a zinc stearate, yes. Then sodium stearate,
20 in the same way. Stearate is a C18 carbon
21 compound. It's a much longer chain.

22 Q. The very next page is called Actafoam
23 R-10. We discussed zinc oxide and 2-ethyl
24 hexanoic acid?

1 A. Now in this case the zinc was reacted
2 with 2-ethylhexoic acid to form the hexanoate.

3 Q. But the final product had zinc oxide in
4 it still; is that correct, by weight? About
5 twenty-one percent?

6 A. No. This would have -- this would have
7 been a reactive product, where you wouldn't have
8 zinc oxide any more. You would have reacted it
9 with the 2-ethyl hexanoic acid. So the product
10 would actually be a zinc 2-ethyl hexanoate,
11 H E X A N O A T E.

12 Q. Is it fair to say when it says
13 "Composition," if it says "Final," such as it did
14 for R-3, that means after all the reactions have
15 taken place?

16 A. Right.

17 Q. The R-34 is also final, so that would be
18 after the reaction?

19 A. Right.

20 Q. The same with the Actafoam.F-2?

21 A. Yes.

22 Q. Now this one says, "Initial." By that
23 you mean, that is what you start with?

24 A. Right.

1 Q. And again, what do you end up with for
2 R-10?

3 A. You end up with zinc 2-ethyl hexanoate
4 and mineral spirits.

5 Q. You end up with a zinc compound and
6 mineral spirits?

7 A. Right.

8 Q. Do you know what mineral spirits are?

9 A. They're an organic solvent that are used;
10 paint thinner type of material.

11 Q. By the way, I see on Actafoam F-2 at the
12 bottom, 309.1 does appear to be mesh.

13 Do you see that?

14 A. Yes. So it is mesh.

15 Q. So it appears the twenty we looked at
16 before was not microns but was, as you said --

17 A. That would have been pretty fine, yes.

18 Q. -- was a mesh?

19 A. Yes.

20 Q. Mr. Riley, we haven't mentioned Actafoam
21 R-5 or R-1. If I could ask you to take a look at
22 Exhibit 18 -- I'm sure you remember that one, we
23 went through it at the last deposition (handing).

24 A. (Witness peruses document).

1 Q. I believe at Page 182 of your deposition
2 you indicated that the R-5 and the R-1 were also
3 blends --

4 MS. BECK: What page?

5 MR. FRANKEL: 182.

6 Q. -- were also blends similar to the R-3.
7 I'm just trying to get to see if you have an
8 opinion as to what R-5 and R-1 are; whether they
9 also have the zinc ethyl hexoate?

10 MS. BECK: Objection to the form of
11 the question.

12 A. Where is the list we just looked at?

13 Q. I don't believe these sheets include one
14 for R-5 and R-1.

15 A. R-5 wasn't in here or R-1?

16 Q. I don't believe so, but if you saw one --

17 A. I don't know what R-1 would have been
18 because R-3 was the main product, so R-1 and R-2
19 must have been unsuccessful early runs that never
20 went anywhere; so I don't think there was an
21 Actafoam R-1.

22 Q. What about R-5? R-1 and R-5 do not
23 appear to be among these sheets, whereas R-3 was.

24 A. Well, I was doing this work, developing

1 these materials. I think I made up a bunch of
2 them and then the ones that weren't successful
3 were dropped out. They just disappeared, and I
4 went on -- I kept the same name on the the ones
5 that were successful.

6 Q. When R-1 and R-5 were being produced, can
7 you tell from looking at Exhibit 18 -- I
8 understand you're saying they weren't produced for
9 a very long time --

10 A. No, I can't tell, because this was done
11 in '83. I was long gone from the scene at that
12 point.

13 Q. From your memory, do you recall whether
14 R-1 and R-5 also involved the 2-ethyl hexoate, the
15 DOP, as well as zinc oxide?

16 A. Well, R-1 looks like R-3, only it had
17 mineral spirits instead of DOP, but there was KOH
18 -- I can't really remember, to tell you the truth
19 -- on R-1.

20 R-5 --

21 Q. Do you remember what the basic product
22 was for R-1, even if you don't remember the
23 specific reactions? Was it zinc?

24 A. It was based on zinc 2-ethyl hexoate.

1 That was the basic configuration.

2 Q. That would be true for R-5, as well?

3 A. Yes.

4 Q. In other words, that's Actafoam,
5 essentially?

6 A. Yes; and that's a very stable compound.
7 Once you make that, there is no -- it doesn't
8 revert or go the other way. The zinc octoate is a
9 stable compound. So that was the base, yes.

10 Q. So is it fair to say that there aren't
11 wastes from these Actafoam products because
12 they're mixtures?

13 A. Oh, yes. There were no wastes.

14 Q. There is no effluent coming from the
15 Actafoam?

16 A. No, none at all.

17 Q. Mr. Riley, for the dioctyl phthalate that
18 was listed under R-3 -- pardon me if I asked you
19 this already -- but what is the chemical -- do you
20 know the chemical formula for the dioctyl
21 phthalate?

22 A. Dioctyl phthalate? I don't know if we
23 went through that or not.

24 Q. What is a pthalate? Maybe I should ask
phthalate

1 you that.

2 A. ^{phthalate} Pthalate is a salt of phthalic anhydride.

3 Q. Phthalic anhydride?

4 A. Yes.

5 Q. Could you tell me what that is?

6 A. Phthalic anhydride is a chemical that
7 contains a benzene group, six membered ring
8 structure and a dianhydride structure, which would
9 be two carbons and three oxygens.

10 Q. What would dioctyl phthalate be, if you
11 know?

12 A. That's an ester. When you take an
13 anhydride and you react it with an alcohol, you
14 get an ester.

15 Q. So it's a ^{phthalate} pthalate ester?

16 A. It's a ^{phthalate} pthalate ester.

17 Q. What does that mean?

18 A. It's a reaction product between an acid
19 anhydride, which is phthalic anhydride, and an
20 alcohol. When you react those together, you get
21 what we call an ester, E S T E R.

22 Q. And that ester is a compound?

23 A. Yes. This is a well-known plasticizer in
24 PVC; very compatible with PVC compounds. That's

1 why it was chosen for use in these products,
2 because it was -- these products went into vinyl
3 compounds.

4 Q. We mentioned or briefly discussed Wytox
5 345, 355 and 438 earlier in the deposition; you
6 may want to refer back to Exhibit 18 which we were
7 looking at a minute ago?

8 A. (Witness complies with request).

9 Q. You testified previously at Page 180, I
10 believe that paraformaldehyde was a raw material
11 that went into making this product. Do you
12 confirm that now?

13 A. Well, for the 345 and the 355 and the
14 438; not for the 312. The Wytox 312 was the base
15 material.

16 Q. When you say the base material, what do
17 you mean by that?

18 A. That was the basic reaction product made
19 from ^{phosphorus} phosphorite trichloride and nonyl phenol.
20 Then this product was reacted with
21 paraformaldehyde to make the 438 and the 345 and
22 the 355.

23 Q. I see. You took Wytox 312 and added
24 paraformaldehyde?

1 A. Reacted it with paraformaldehyde. Not
2 just adding it. It was an actual reaction.

3 Q. You testified previously that
4 paraformaldehyde was a solid of formaldehyde?

5 A. It's the polymeric form of formaldehyde.
6 Formaldehyde itself is a gas, but when you can
7 build it up to a significant high molecular weight
8 you get a solid which is somewhat stable.

9 Q. Does the paraformaldehyde react with the
10 phosphorous trichloride or the nonyl phenol? What
11 happens to the paraformaldehyde?

12 A. It reacts with the Wytox 312 by a
13 condensation reaction.

14 Q. And what happens?

15 A. You split out water and you form a
16 methylene bridge, a CH₂ bridge between two other
17 carbon atoms, so, in effect, you're making a
18 polymer.

19 Q. Of the paraformaldehyde and --

20 A. And the other structures.

21 Q. So is paraformaldehyde one of the
22 composites of the final product?

23 A. No. Because it's been changed. It's
24 been reacted and split off water, and now it's

1 just a CH₂. It's one CH₂ among two large items.
2 And you can go to many more numbers.

3 Q. Do you believe that process goes to a
4 hundred percent completion with respect to the
5 paraformaldehyde?

6 A. Yes. Because it was run under vacuum to
7 remove the water of condensation. In condensation
8 there was a by-product of water. The vacuum would
9 remove any water that was in the system, if there
10 were any.

11 Q. Was that the purpose of the vacuum?

12 A. The purpose was to make the reaction go,
13 to pull off the water, because you have to remove
14 the by-products to keep a reaction going.

15 Q. In terms of the production of the Wytox
16 345, 355 and 438, do you know when the
17 paraformaldehyde was added; at what point in the
18 process?

19 A. Well, it was added when it was supposed
20 to be, in the sequence.

21 Q. When was it supposed to be added?

22 A. The Wytox -- trisnonylphenylphosphite was
23 made first by reacting ^{PA 3}PCl₃ and nonyl phenol. And
24 the by-product for this step was HCl gas, which

1 was stripped off until it was all out of the
2 product. Then the formaldehyde -- the
3 paraformaldehyde, was added to effect the
4 polymerization. So it was the second step of the
5 process.

6 Q. Going back to the gypsum cake, itself,
7 did the cake have an odor?

8 A. No.

9 Q. You said no?

10 A. No.

11 Q. Did it have a color, other than white?

12 A. No. It was white.

13 Q. It was white?

14 A. Nice white material.

15 Q. We already talked about the 1970 letter
16 that was sent by Mr. McBrien to the State of
17 Massachusetts, and your testimony is that you
18 don't know anything about the analysis in that
19 letter; is that correct?

20 A. That's correct. I don't know where the
21 analysis came from. I said I suspected it was a
22 desk study. I can't prove that.

23 Q. Just to be sure your testimony is clear;
24 is it your testimony that you don't know whether

1 or not any pilot plant or simulation pilot study
2 was ever done?

3 A. No.

4 Q. You don't know?

5 A. No.

6 Q. So at least as far as you're aware, is it
7 fair to say that the first cake that was produced
8 was actually produced at the plant, itself, when
9 it started operation?

10 A. I believe that that was true, yes.

11 Q. Are you aware of any analyses of the
12 gypsum cake other than that letter?

13 A. No.

14 Q. In other words, you didn't go out there
15 at the time and take samples --

16 MS. BECK: Objection.

17 I think we're getting into discovery
18 matters rather than opinion matters.

19 A. No. The material was so innocuous, no
20 one worried about it. It was perfectly white. It
21 didn't smell, so it was not a concern of anybody
22 or a research experiment to find out what it might
23 be. We were happy the filter worked. The
24 neutralizer worked, the treatment plant worked, so

1 we were ecstatic when the filter worked and we got
2 a dry cake, rather than to get a sludge or a wet
3 material that we couldn't filter. The first time
4 we started the filter up, it worked perfectly and
5 we got a nice dry cake that came off into the
6 container.

7 Q. Again, when you say you got a dry cake,
8 you previously testified, did you not, that there
9 would be a thirty --

10 A. Thirty-five percent moisture, but when
11 you can pour a cake, you consider that a dry cake.

12 Q. Because it had a low enough moisture
13 content to fall off the drum?

14 A. Right. But when you can pour a material,
15 when it's free-flowing, that can be fifty percent
16 moisture, but if it's free-flowing we call it a
17 dry cake.

18 Q. That's what --

19 A. Because it means you can convey it, take
20 it off a filter, you can convey it on conveyors,
21 you can do, you know, all sorts of things,
22 compared to a sludge. A sludge just sits in a
23 position, and you can't do much with it and it's a
24 pain in the neck.

1 Q. It's more like mud?

2 A. Yes. It's terrible in processing. So
3 your eyes light for joy when you see a dry cake
4 coming off a filter the first time, and that's
5 what we had; and a cake that didn't smell, that
6 was innocuous, that was even better.

7 Q. Let me ask you a couple more questions
8 about the ammonia issue.

9 You agree, do you not, there was ammonium
10 sulfate as a by-product of the Kempore
11 manufacture?

12 A. Yes; up until the time that the process
13 was changed and the ammonia was taken off,
14 scrubbed, and used to make hexamethylenetetramine.

15 Q. Again, that time was --

16 A. I can't pinpoint it. I said some time
17 mid-seventies, '73, '74. It could have been '72.

18 Q. Assuming that if we're talking about a
19 time before the ammonia was taken off, and you had
20 the ammonium sulfate, wouldn't ammonium hydroxide
21 form after the addition of a lime?

22 A. I think I testified before that I don't
23 think you would form it at pH 7 to 8; that you
24 would have to go to a much higher pH, which you

1 did not go to in the treatment plant.

2 Q. So if you had added limestone until you
3 got up to 10 or 11, you believe that you would
4 have the ammonium hydroxide?

5 A. At some point you would. You would free
6 ammonia and everybody could smell it. Ammonia is
7 pretty strong. You start releasing ammonia and
8 you would choke everybody to death in the
9 vicinity. And this filter was in a closed area.
10 It was indoors in a closed area, so we never had
11 that problem.

12 Q. When you got up to about a pH of 8 or so,
13 would you have a little bit of ammonium hydroxide,
14 or does it not appear at all until you get to the
15 higher pH?

16 A. You wouldn't have any at all until you
17 get to the higher basicity. You just continue to
18 have ammonium and sulfate ions floating around in
19 the system. If you took a sample to dryness you
20 would get ammonium sulfate with your product.

21 Q. Do you have an opinion as to whether or
22 not there were organic materials in the gypsum
23 cake?

24 A. My opinion would be that there wouldn't

1 be any organics.

2 Q. Why do you say that?

3 A. Well, we had an oil skimmer system in the
4 treatment plant, so that everything that was
5 picked up in the first sump, the organics tend to
6 float on the top and the aqueous system was on the
7 bottom. We had a continuous oil skimmer that took
8 the organics, which did not mix with the water,
9 out of this sump into a collection system. And
10 they[^] were burned in the boiler. Because you
11 always get some materials coming in, some road
12 oils and so forth.

13 Q. Just to be sure I understand; as I
14 understand it, you've got the various
15 manufacturing processes that each have their own
16 effluent?

17 A. Right.

18 Q. The effluents are combined in the
19 equalization tank; is that correct?

20 A. Yes.

21 Q. And then afterwards you send it to
22 another tank where you add the calcium hydroxide?

23 A. Yes.

24 Q. Now, where do you find these organic

1 skimmings or whatever you would call it?

2 A. That was in the second tank, basically.
3 In other words, there was an equalization tank
4 that was agitated where the streams came together
5 and you got a general mix. Then there was a
6 second sump without any agitation where you
7 overflowed in from the first equalization tank
8 into this chamber.

9 In this chamber you had --

10 Q. The second chamber?

11 A. The second; there is no agitation so the
12 organics floated on the surface. It mostly was
13 all water and a little organic on the surface.
14 And we had what we called an oil-skimming device.

15 Q. You had the calcium hydroxide in the
16 second container?

17 A. No. We take the oil out in this one, or
18 whatever is on the surface. Then this tank slowly
19 flowed into the other tank. It was pumped into
20 the other tank where the lime was added for
21 neutralization. This was sort of a reserve to
22 feed the neutralization chamber when material was
23 needed.

24 Q. What is a sump? When you referred to

1 sump --

2 A. Sump is a lowest point in a system where
3 you collect something.

4 Q. What is your opinion as to the origin of
5 that organic material that was floated to the top
6 in that second sump?

7 A. It came from the paved areas in the
8 plant. We had a lot of asphalt areas that were
9 paved in the plant. We had tank trucks that
10 delivered materials, and they would bring in
11 organics on their tires. And automobiles leave
12 organics in an area; trucks do. And these wash
13 into the collection system during a rain storm and
14 they end up on the surface of the treatment plant.
15 Plus any spills, if there are any spills in
16 unloading the raw materials, we unloaded tank
17 trucks into storage tanks, and every so often the
18 trucker would drop a hose with a half-gallon of
19 liquid in it, and it might spill on the walk, and
20 then this would be washed into the collection
21 system and it went to the treatment plant.

22 Q. So to be sure I understand that; you're
23 saying that it wasn't just the by-products of
24 manufacturing that went into the treatment plant,

1 it was also spills or other materials that were
2 cleaned up or washed into a sewer system that fed
3 into the same plant?

4 A. Right. Absolutely. And this is where
5 you picked up your organics. Everything fed into
6 that treatment plant.

7 Q. Except for sanitary-type waste? It
8 didn't all --

9 A. Sanitary didn't go into that. Sanitary
10 went into a septic system.

11 Q. At the time you added the calcium
12 hydroxide, is it possible that some of the
13 organics would have adsorbed onto the gypsum?

14 A. No. They were gone. That's in the next
15 chamber. They -- they stay in this chamber until
16 they're scooped out with this continuous oil
17 skimmer. They're always on the top. You pumped
18 from the bottom of that chamber so that what's on
19 top stays -- is isolated in that chamber. It can
20 never go into the lime system next door, unless
21 you emptied it, and we never did that.

22 Q. Then finally, you say -- to be sure I
23 understand the prior testimony -- you say there is
24 a vacuum filter that rotates?

1 A. Yes.

2 Q. And it picks up the gypsum cake and the
3 liquid?

4 A. Right.

5 Q. And dries it to some extent?

6 A. Yes.

7 Q. Then somehow that material is taken off
8 the filter and dropped into a basin of some sort?

9 A. Scooped off with a knife arrangement, and
10 it dropped in a receptacle, and the liquid goes to
11 the interior of the drum and then was sent to the
12 sewer.

13 Q. Mr. Riley, there was an attachment to
14 your deposition notice called Attachment A, which
15 asked that certain types of documents be brought
16 to the deposition, itself. Maybe I should direct
17 this to Counsel.

18 MR. FRANKEL: I'm not sure because
19 of the nature of your expert report that some of
20 it is even applicable.

21 Can I ask Counsel whether those documents
22 have been brought to the deposition?

23 MS. BECK: I filed an objection to
24 that which paralleled the objection that Tom

1 Hannigan filed on behalf of all of the parties.

2 Do you have a copy of the attachment and I
3 can respond specifically?

4 MR. FRANKEL: I just have the
5 attachment. I don't have the deposition notice,
6 but I believe they were all the same.

7 MS. BECK: I objected to "All
8 correspondence between yourself and the party
9 and/or party's attorney on whose behalf you are
10 testifying" as part of attorney/client privilege
11 and attorney/client work product.

12 "All treatises, articles, books and other
13 literature which you used in formulating your
14 opinion in this case"; I don't have any objection
15 to your asking this witness as to what they were.

16 "All reports and drafts of reports that you
17 prepared in this case"; Mr. Riley hasn't prepared
18 a written report or any draft reports. And I
19 would object to that as being work product.

20 "All other documents that you relied upon
21 in formulating your opinion in this case and in
22 drafting your reports and/or draft reports"; I
23 think you can ask him, and I think you'll find
24 it's all the documents that you've been asking him

1 about.

2 BY: MR. FRANKEL:

3 Q. Mr. Riley, it's a little tough since your
4 expert opinion is your deposition testimony. As I
5 understand it, you didn't prepare a report for
6 Stepan on this subject; is that correct?

7 A. That's right.

8 Q. Are you relying on any particular
9 treatises or books or articles --

10 A. No.

11 Q. -- in connection with your testimony?

12 A. Simply my memory and skills.

13 Q. So you're relying on your general
14 education --

15 A. Right.

16 Q. -- as well as your memory of what
17 happened at the plant?

18 A. Right.

19 MS. BECK: And experience and
20 training in the field?

21 A. Experience and training, yes. You have
22 to consider I worked for ten years in a very
23 narrow area of nitrogen chemistry, so one gets
24 expert by doing that.

1 Q. In connection with preparation for your
2 testimony today or in connection with your prior
3 deposition, did you review any documents related
4 to the products produced at the facility or the
5 nature of the chemical composition of those
6 products, other than documents that were produced
7 at the depositions themselves?

8 A. No. I went through some of the chemistry
9 and some of the equations just to familiarize
10 myself again with the chemistry going on.

11 Q. Is it fair to say that you haven't seen
12 any documents that were prepared contemporaneously
13 back in the 1970s that relate to the composition
14 of these products other than the ones we've talked
15 about at your various depositions?

16 A. No. I haven't seen any. We have no
17 records of anything like that. That all went to
18 the Olin Company.

19 MR. FRANKEL: Why don't we take a
20 short break. I don't think I have much more.

21 (Whereupon, a brief recess was
22 taken).

23 CONTINUED DIRECT EXAMINATION

24 BY: MR. FRANKEL:

1 Q. Mr. Riley, before we took a break, you
2 indicated that general spills and that type of
3 thing at the plant would have been washed into a
4 chemical sewer that was fed into, I guess, the
5 equalization tank. Let me ask you, was it fed
6 into the same equalization tank as the other
7 products -- effluent from the manufacturing
8 process?

9 A. Yes.

10 MS. BECK: I object to this line of
11 inquiry as it is discovery and not expert inquiry.

12 MR. FRANKEL: Again, as I stated
13 earlier, I think it's relevant to his opinions
14 related to what would be ultimately found in the
15 gypsum cake. It's not pursuing a new line of
16 discovery into other types of waste products that
17 might have gone from the Stepan plant to the
18 Charles George Landfill.

19 Q. When you say general spills, is there
20 anything in particular that you have in mind?

21 A. No. There were occasions when material
22 was spilled in the buildings or in the yard and
23 this material was washed down and was conveyed to
24 the equalization tank.

1 Q. When you say conveyed, was there like a
2 sewer that ran to there?

3 A. Yes. It was all piped in.

4 Q. Other than general spills, are there
5 other sources of material that went into the
6 equalization tank? We've talked about the
7 effluent from the process.

8 A. The processes went direct. The drains in
9 the buildings, and the yard drains all went to the
10 equalization tank.

11 Q. When you say the drains in the building,
12 do you mean like a sink in a bathroom? Did that
13 go?

14 A. No. There were drains in the floors in
15 the process buildings.

16 Q. In the floors of the buildings?

17 A. Yes. So that you had the process, the
18 filters going directly on their own system, and
19 then you had drains in the middle of the floors
20 which allowed you to wash the floor and so forth
21 or pick up any spills.

22 Q. But they ended up at the same place?

23 A. Yes.

24 Q. But you're not aware of any particular

1 types of material that were spilled?

2 A. Just over the years there were small
3 amounts.

4 Q. We talked earlier about Actafoam R-5; you
5 might want to look at Exhibit 18 again. That
6 might be helpful to you.

7 I note that, at least according to this
8 exhibit, there is cadmium oxide and zinc oxide as
9 two oxides that are indicated as ingredients. Do
10 you recall whether or not they were, in fact,
11 ingredients?

12 A. No, I don't. I don't recall this
13 product, really, at all.

14 Q. So it's your testimony that you don't
15 know whether or not cadmium oxide was an
16 ingredient of Actafoam R-5?

17 A. No, I don't. This was not a big product.
18 This was a research-type product made in small
19 quantities. Never sold very much. The XR-34 is
20 the same way. The R-3 was the main product.

21 Q. That indicates "Operated '63 - present"
22 on the remarks over on the right of this?

23 MS. BECK: I'm going to object.

24 We're getting into factual areas versus

1 opinion areas. This is not a factual deposition.

2 This is an opinion deposition.

3 A. It says the R-34 is discontinued. The
4 R-5 was discontinued, so I don't know when that
5 was, but they were not big items.

6 Q. With respect to the production of the
7 azodicarbonamide, which is Product No. 2, I take
8 it a filter was used for that product as well?

9 A. Yes.

10 Q. The same as Opex?

11 A. Not the same type of filter.

12 Q. Do you have an opinion as to whether or
13 not the product, itself, any of the product would
14 have gone through the filter with the filtrate?

15 A. Some might have.

16 Q. Why do you say that?

17 A. Well, the azodicarbonamide was finer than
18 the Opex. It tended to run twelve to twenty
19 microns average particle size, which is pretty
20 fine.

21 Q. What was the filter? What would the
22 micron size of the filter be?

23 A. It was a rotary drum vacuum filter, the
24 same as the sludge. It was the same as the gypsum

1 filter -- the same type.

2 Q. So for the gypsum I think you said it was
3 twenty-five microns -- I'm sorry, for the Opex,
4 you said it was twenty-five microns in diameter
5 for the filter? Was that the same filter you
6 used --

7 A. I don't recall, to tell you the truth. I
8 really don't.

9 Q. Do you have an opinion as to how much of
10 the azodicarbonamide might have gone through?

11 MS. BECK: Objection.

12 I think his testimony was that it might
13 have gone through.

14 Q. Do you have an opinion about the amount?

15 A. No, I couldn't quantify that.

16 Q. With respect to the gypsum cake or the
17 calcium sulfate, do you have any opinion with
18 respect to whether organic materials tend to
19 easily adsorb onto that product?

20 MS. BECK: Objection.

21 A. No.

22 Q. By no, do you mean you don't have an
23 opinion either way?

24 A. I don't have an opinion.

1 Q. Referring again to Product No. 2, the
2 Kempore, I believe you indicated earlier that
3 sodium chlorate was used as an oxidant or
4 oxidizer? Is that the proper term?

5 A. Yes.

6 Q. Oxidizing agent?

7 A. Yes.

8 Q. Do you have an opinion as to whether or
9 not chlorites or hypochlorites would be present in
10 that reaction?

11 A. Present in the reaction?

12 MS. BECK: Objection.

13 A. I don't understand the question.

14 Q. If there were excess sodium chlorate, I
15 take it that that would be part of the effluent;
16 is that correct?

17 A. Well, there shouldn't be any excess
18 chlorate because you added chlorate right up to
19 the last molecule of your material to be oxidized,
20 and then you stopped, so there wouldn't be any
21 reason for excess chlorate in the system.

22 Q. When the sodium chlorate oxidizes the
23 product, what happens to the sodium chlorate?
24 Something happens to the chlorate, doesn't it?

1 A. It's reduced to sodium chloride.

2 Q. Chloride?

3 A. Yes.

4 Q. Do you know what chlorites and
5 hypochlorites are?

6 A. Yes.

7 Q. Would they be present after the reduction
8 to the chloride?

9 A. Oh, no. No case, no technical case for
10 chlorite or hypochlorite being in that system.

11 Q. And your opinion is that they wouldn't be
12 there during the process, itself, or in the
13 effluent?

14 A. No.

15 Q. Or in the final product?

16 A. No. They wouldn't ever be there.

17 Q. Why is that?

18 A. Because sodium chlorate does not go
19 through a hypochlorite stage, or a chlorite stage
20 as an oxidant. The chemistry --

21 Q. Chlorate, I take it, is ClO_3 ?

22 A. Yes.

23 Q. What would chloride be?

24 A. ClO_2 ; and hypochlorite or chlorite is

1 C101.

2 Q. And your testimony is that even if you
3 did have excess sodium chlorate, there would be no
4 process whereby you would obtain a chlorite or a
5 hypochlorite?

6 A. Absolutely. Entirely different reaction.

7 Q. Is that true after the addition of the
8 lime, as well?

9 A. Yes.

10 Q. Even if there were the chlorate there,
11 you wouldn't expect a chlorite?

12 A. No. That's a different product. Made a
13 different way. A chlorite and hypochlorite --
14 entirely different.

15 Q. Mr. Riley, I note that your prior
16 deposition testimony, which has been designated as
17 your expert report, does not go into the issue of
18 what happens at landfills or what happens to
19 various wastes disposed of at landfills.

20 Do you expect to give any testimony on that
21 issue in the trial of this action? Maybe I should
22 be directing that to your counsel as well as to
23 you?

24 A. I guess -- I don't know. If I were asked

1 the question, I would testify to my opinion, I
2 guess.

3 MS. BECK: Only if the judge allows
4 your expert to testify regarding a matter that
5 wasn't disclosed in his expert report, which I
6 objected to, would Mr. Riley then offer testimony
7 on the same matter.

8 Your expert has offered the opinion that he
9 may also testify as to what happens to wastes when
10 disposed of in landfills without offering any
11 opinion as to what happened with them, and I've
12 objected to his offering any testimony on that
13 area because he wasn't disclosed.

14 If the judge disagrees with that objection
15 and permits your experts to testify, then I would
16 present Mr. Riley as our expert to testify on
17 those matters.

18 MR. FRANKEL: Well, I suppose the
19 judge's ruling presumably would be the same for
20 both of us on this issue.

21 MS. BECK: One never knows, does
22 one.

23 MR. FRANKEL: So since I don't know
24 what the judge's rulings are going to be, maybe

1 I'd better ask Mr. Riley what his opinions are on
2 these issues.

3 BY: MR. FRANKEL:

4 Q. Do you have an opinion, Mr. Riley,
5 concerning what would happen to gypsum cake when
6 it was disposed of in a landfill?

7 A. I think gypsum, nothing would happen to
8 it. It's as an innocuous a material as you can
9 get. It's not going to break down into
10 components. It's just going to stay there.

11 Again, I worry a little bit about giving an
12 opinion on landfills because how does one know the
13 conditions in a landfill? I can just tell you
14 what compounds are very strong and wouldn't break
15 down under certain conditions. Gypsum is one of
16 them.

17 Q. Gypsum being calcium sulfate?

18 A. Yes.

19 Q. Have you studied any of the reports
20 related to the Charles George Landfill?

21 MS. BECK: Which in particular are
22 you talking about?

23 Q. The remedial investigation/feasibility
24 study reports.

1 A. I've seen some of them. I can't quantify
2 which ones they were. I've seen some that have to
3 do with the engineering, the new cover, and so
4 forth.

5 Q. What other information do you have about
6 the Charles George Landfill, or that have you
7 seen?

8 A. I've seen reports that there was leachate
9 of chemicals coming out.

10 Q. Anything else?

11 A. No.

12 Q. Do you know what these reports were that
13 you've seen?

14 A. I think they were U.S. EPA reports that I
15 saw.

16 Q. Assuming that there were trace elements
17 in the calcium sulfate sludge as set forth in the
18 1970 letter from Mr. McBrien to the Commonwealth
19 of Massachusetts, have you attempted to formulate
20 any opinions as to what would have happened to
21 those materials in the Landfill?

22 MS. BECK: Objection.

23 A. No.

24 Q. So with respect to the gypsum cake, is it

1 fair to say that your opinion is limited to what
2 would happen to the calcium sulfate part of the
3 gypsum cake?

4 A. My opinion of that is that it's very
5 stable and nothing would happen to it.

6 Q. And just to be sure I'm clear; you
7 haven't looked into or analyzed the issue of --
8 assuming that those trace materials were in the
9 cake as set forth in that letter -- you haven't
10 tried to examine what you think would have
11 happened to them?

12 A. No.

13 Q. Have you attempted to analyze what would
14 have happened to any of the finished products of
15 Stepan Company, had they been disposed of at the
16 Landfill?

17 A. Well, azodicarbonamide is a very stable
18 compound. It's almost impossible to react with
19 that in any way, shape, form, or manner.

20 Q. That's Product No. 2?

21 A. It doesn't react with anything.

22 Q. So had that been disposed of at the
23 Landfill, do you have an opinion as to what would
24 have happened to it?

1 A. Nothing would happen to it.

2 The zinc salts, the zinc octoates are
3 stable material. They would not decompose.

4 Q. Those are the Actafoams?

5 A. Yes. That's a very strong, stable
6 material. When you make that, you can heat the
7 heck out of it and kick it with lots of stuff and
8 it won't break down. It's a very, very stable
9 material.

10 Q. What about the Opex, the
11 dinitrosopentamethylenetetramine?

12 A. That, if you had any, it would be a
13 stable compound as long as you didn't bring
14 it in contact with acid. But I assume that
15 that wouldn't make it through the treatment
16 plant because of the strong acid. We've had
17 drying --

18 Q. What I'm talking about now is the final
19 product. Let's say assuming that someone --

20 A. Dumped it in there?

21 Q. Right. The final product; if someone put
22 the final product in the Landfill, do you have an
23 opinion as to what --

24 A. No, I don't, really.

1 Q. -- what would have happened to it?

2 A. I don't have an opinion.

3 Q. That's the
4 dinitrosopentamethylenetetramine?

5 A. Right.

6 Q. You don't have an opinion what would
7 happen to that?

8 A. I would assume it would still be there
9 twenty years later, but I don't know the
10 conditions in the Landfill.

11 Q. You make the same assumption with respect
12 to azodicarbonamide?

13 A. I said that was very stable because that
14 doesn't react with anything.

15 Q. What about the Wytox; if that had been
16 disposed of at the Landfill, would you have any
17 opinion --

18 A. I don't have an opinion without knowing
19 the conditions.

20 Q. It's your testimony that you're not
21 familiar with the conditions at the Charles George
22 Landfill?

23 A. Yes. That's for sure. I don't know what
24 is the temperature and pressure that these things

1 -- anything that was in there would be at. But I
2 don't think any of these chemicals are in there in
3 the first place. I don't see how they would have
4 gotten in there. I've testified that way for
5 three days. I don't see how any of these things
6 would have made it in there.

7 Q. Right. Well, the gypsum cake issue is
8 not the only possible --

9 A. The cake is there, yes. The cake is
10 there. If some azodicarbonamide in small amounts
11 went with the cake, assuming it's very fine
12 particle size material and some of it did get
13 through the filter, and if some was included with
14 the gypsum, it would be as stable as the gypsum,
15 absolutely.

16 So if it went up there with the gypsum in
17 trace amounts, analyzable but not quantifiable,
18 then the azodicarbonamide would be just as stable
19 as the gypsum would be in that landfill. You
20 would not have it break down into any by-products
21 at all. It would still be sitting there. It
22 would not be leaching out as a different chemical.

23 I'm sure of that, because, after working
24 with it for so many years.

1 Q. And with respect to the
2 dinitrosopentamethylentetramine, you're not as
3 sure about that one?

4 A. I don't have an opinion. I don't know
5 enough about it. I don't see how that would have
6 gotten in there, because it would not have
7 survived the treatment plant. We had drying ovens
8 that caught on fire with Opex in them, because the
9 Opex hadn't been completely washed and there was
10 some acid left with the product, and the product
11 decomposes pretty quick. So that experience leads
12 me to say it would never have survived through the
13 treatment plant.

14 MR. FRANKEL: I have no further
15 questions.

16 CROSS-EXAMINATION

17 BY: MR. GOODE:

18 Q. Mr. Riley, are you an owner of Stepan or
19 an employee?

20 A. I'm an employee. I'm an officer.

21 Q. Officer?

22 A. Vice President for Manufacturing and
23 Engineering.

24 Q. Do you own any stock in the company?

1 A. Yes.

2 MR. GOODE: I have no other
3 questions.

4 (At 2:45 p.m. the deposition was
5 concluded).

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C
1 CERTIFICATE

2 I, Charles P. Riley, Jr., do hereby
3 certify that I have read the foregoing
4 transcript of my testimony taken on
5 March 12, 1991, and further certify that said
6 transcript is a true and accurate record of
7 said testimony.

8 Dated on this _____ day of

9 _____, 199__.

10
11
12 _____
13 CHARLES P. RILEY, JR.

14 Signed under the pains
15 and penalties of perjury.
16
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CERTIFICATE

Commonwealth of Massachusetts

Middlesex, ss.

I, Deborah L. Fitzpatrick, Registered Professional Reporter/Certified Shorthand Reporter, and Notary Public in and for the Commonwealth of Massachusetts, do hereby certify:

That Charles P. Riley, Jr., the witness whose deposition is hereinbefore set forth, was duly sworn by me and that such deposition is a true record of the testimony given by said witness.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial seal this 13th day of March, 1991.

CSR/RPR and Notary Public

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